Deliverable No. 4

# Remedial Investigation Report (Volume 1 of 2: Report)

## Fieldstone Property
## Consent Order
## Docket No. HSA-CO 01/02-154


18 June 2004

Submitted to:

Department of Toxic Substances Control
Northern California Cleanup Operations
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**DELIVERABLE NO. 4**

**REMEDIAL INVESTIGATION REPORT**

**CONSENT ORDER, DOCKET NO. HAS-CO 01/02-154**

**FIELDSTONE PROPERTY**

**ORANGE COUNTY, CALIFORNIA**

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Eric Smalstig, P.E.


Date: 9 FEBRUARY 2004

# FIELDSTONE PROPERTY REMEDIAL INVESTIGATION REPORT EXECUTIVE SUMMARY

## Overview

This report documents the results of the Remedial Investigation (RI) conducted at the 42-acre Fieldstone Property (the Site) in Orange County, California. The primary goal of the RI was to collect additional environmental data to further evaluate the nature and extent of contamination at the Site. Prior to implementation of the RI, historical soil sample data showed that polychlorinated biphenyl (PCB-1260) was present in a limited area of the Site (i.e., an Area of Concern approximately 2 acres in extent) within the upper few feet of soil [GeoSyntec, 2003]. The RI included an expanded scope of sample collection and laboratory analysis to evaluate the nature and extent of contamination within soils across the entire 42-acre Site, groundwater adjacent to areas having observed soil contamination, and stormwater that accumulates on the Site. The expanded scope of laboratory analysis included a broader suite of analytes, including polycyclic aromatic hydrocarbons (PAH), dioxins and furans, and metals, in addition to PCBs.

Results from the RI reflected that polychlorinated biphenyl (PCB-1260) is the primary constituent of concern at the Site and that it may be distributed in a more limited portion of the Site and at lower concentrations than previously indicated. The RI included collection and analysis of 733 soil samples performed in September through December 2003. PCB-1260 was detected above the 0.18 milligram per kilogram (mg/kg) screening concentration in RI soil samples collected from a localized area (i.e., approximately one acre within the Area of Concern) of the upper 2.5 feet of soil. Within this localized area of impact, a yet more limited area, approximately 0.2-acre in extent, yielded soil samples collected up to 4.5 feet deep having PCB-1260 concentrations greater than the 0.18 mg/kg screening concentration. The Site was first fenced in 1999 to reduce the potential for human exposure to impacted Site soil. Stormwater migration engineered controls were implemented to reduce migration of soil off-Site. Additionally, preliminary calculations indicate that even the highest concentrations of PCB-1260 detected during the RI and previous sampling events would not pose a fugitive dust risk above the acceptable level of $10^{-6}$ probability of occurrence in surrounding populations. The maximum surficial soil PCB-1260

concentration found during the 2003 RI was 590 mg/kg in a single sample location. This concentration is less than 20 percent of the lowest calculated preliminary fugitive dust screening concentration. Also, no target analytes were detected in the five groundwater samples. Accumulated stormwater was sampled in two locations and did not contain detectable concentrations of PCB-1260. The RI objectives have been achieved. Details of the overall project, the RI implementation, and the subsequent data evaluation are presented in this report and summarized below.

## Background

The Site is an approximately 42-acre parcel located in an unincorporated area of Orange County, adjacent to the City of Huntington Beach, California. Soil samples were collected at the Fieldstone Property by State of California representatives prior to 1999. The samples were analyzed during the performance of an environmental assessment of adjacent property, known as the Bolsa Chica Lowland. PCB was detected within the Area of Concern in those soil samples [CH2M Hill, 2001]. Hearthside Residential Corp. (Hearthside), the Site owner, expanded the chemical analytical data set in subsequent soil sampling events. Although Hearthside recently purchased the property in 1997, and never operated or used the property, Hearthside voluntarily entered into Consent Order, Docket No. HAS-CO 01/02-154 (CO) with the Department of Toxic Substances Control (DTSC) to address the Site soil contamination. The CO provides a framework for evaluation of the Site, including evaluation of the nature and extent of the contamination, evaluating potential risks posed by the contaminants to humans and ecological receptors, and assessment methods to mitigate these risks through the implementation of remedial measures, if needed. The CO identifies a list of required deliverables, one of which is this RI Report; the status of deliverables is presented in Table ES-1.

## Remedial Investigation Scope

The RI Workplan [GeoSyntec, 2003] was approved by DTSC in August 2003. The RI implementation began in September 2003, in accordance with the approved RI Workplan. Soil samples were collected in September 2003, and groundwater samples were collected in October 2003. Based on the results of the soil samples collected in September, additional confirmatory soil samples were collected in

December 2003 under a DTSC-approved supplemental RI workplan. Stormwater samples were collected in April 2004. Figure ES-1 presents the map of sampling locations. A total of 733 soil samples were collected from the surface to depths of 6.5 feet below ground surface (ft bgs). Five groundwater samples were collected from the uppermost groundwater bearing zone underlying the Site at depths of approximately 20 ft bgs. Two samples of accumulated stormwater were collected. In accordance with the DTSC-approved RI Workplan, soil, groundwater, and surface water sample analysis included:

- PCB-1260 analysis (not congener-specific) (EPA Method 8082);
- PCB speciation according to congener composition (EPA Method 1668A);
- Dioxin/furan (EPA Method 8280A);
- Polynuclear aromatic hydrocarbon analysis (EPA Method 8310); and
- Metals analysis (EPA Methods 6010B/7000).

Several quality assurance / quality control (QA/QC) samples were also analyzed as specified in the RI Workplan. DTSC representatives were also on site to observe sample collection procedures and collect samples for independent confirmation of results obtained by this study.

## Summary of Results

To evaluate the soil and groundwater sample chemical results, chemical concentrations were compared to the following concentrations:

- The preliminary soil screening concentration for PCB-1260 of 0.18 mg/kg based on ecological risk[1];

- US EPA (Region IX) Preliminary Remediation Goals (PRG) based on human health risk (e.g., PCB-1260 residential PRG of 0.22 mg/kg);

[1] The most conservative screening concentration (0.18 mg/kg) was originally provided by DTSC prior to submittal of the RI Workplan based on preliminary assessment of ecological screening values.

- Toxic Substances Control Act (TSCA) cleanup level for PCB in high occupancy areas of 1 mg/kg; and

- State of California waste criteria (California Code of Regulations – Title 22 (CCR T22)), based on hazardous classification (e.g., PCB-1260 concentration of 50 mg/kg).

Based on historical chemical analytical results, PCB-1260 was the primary constituent of concern for the RI. Chemical analytical data from soil samples collected during the RI confirm that PCB-1260 is within a limited portion of the Site. The recent PCB speciation results from congener analysis are also consistent with historical Site soil PCB composition data. Historical chemical analytical results reflected that PCB-1260 was detected in Site soils greater than the 0.18 mg/kg screening concentration in an Area of Concern approximately two acres in extent [GeoSyntec, 2003]. Out of the 733 RI soil samples, 49 were reported by the laboratory to contain PCB-1260 greater than the 0.18 mg/kg screening concentration. Forty-four (44) of these samples were collected from discrete sampling depths within the upper 2.5 feet at 22 locations. These locations are concentrated in an area approximately one acre in extent, which is consistent with the general area where PCB-1260 was found during historical sampling. This area is coincident with the primary debris pile area located near the northeastern property boundary where Graham Street, Bankton Drive, and Beck Circle intersect the Site (see Figure ES-2). Out of the 733 soil samples collected, laboratory results indicate that only six samples contained PCB at a concentration exceeding the CCR T22 waste criterion for PCB of 50 mg/kg. The RI results for PCB-1260 exceeding 50 mg/kg were from the upper 0.5 feet of an approximately 0.2-acre portion within the one-acre area (see Figure ES-2). Within the 0.2-acre area, RI soil samples collected from discrete depths up to 4.5 feet bgs exhibit PCB-1260 concentrations exceeding the 0.18 mg/kg screening concentration.

Dioxin and furan analysis was performed on select soil samples to evaluate their potential co-location with PCBs. Of the five soil samples analyzed for dioxins and furans, one sample from the 0-0.5 ft bgs soil interval at location SS-134 (see Figure ES-

1), was reported to contain 6.0 micrograms (µg)/kg of 1,2,3,4,5,6,7,8-octachlorodibenzo-*p*-dioxin (OCDD), which is slightly above its PRG[2].

Seventy (70) of the RI soil samples were selected for PAH analysis to evaluate their potential co-location with PCBs. Of the 70 soil samples tested for PAH, five of the reported detections were greater than PRGs. The PAH results that exceed PRGs are from samples collected in the upper 2.5 feet of the one-acre area associated with elevated PCB-1260 results.

Eighty two (82) of the RI soil samples were selected for metal analysis to evaluate their potential co-location with PCBs and to evaluate the arsenic and lead soil concentrations in the vicinity of two historical soil sampling locations that were reported to contain arsenic and lead concentrations above Bolsa Chica Lowland background [CH2M Hill, 2001]. Of the 82 RI samples tested for metals, none were reported to contain metal concentrations above PRGs. In the vicinity of the two historical sample locations with elevated arsenic or lead results, none of the twelve arsenic results is above background. One (SS-80C4-A) of the twelve lead results is above the background concentration, but the concentration is still only approximately 10 percent of the PRG.

The five groundwater samples did not contain detectable concentrations of PCB-1260 or PAH. Groundwater does not appear to be a media of concern based on the groundwater results and the predominance of soil detections in samples from the upper few feet of Site soil, several feet above groundwater.

PCB-1260 was not detected in the two samples of accumulated stormwater collected at the Site.

[2] The 1989 ITE factors were used to calculate the PRG for OCDD [Cal-EPA, 1996]. They are common dioxin and furan evaluation factors that relate the toxicity of given compounds to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), which has available screening concentrations. For OCDD, one µg/kg of OCDD is equivalent to 0.001 µg/kg of 2,3,7,8-TCDD. Therefore, the 6.0 µg/kg is equivalent to 0.006 µg/kg of 2,3,7,8-TCDD, which is above the 0.0039 µg/kg PRG for 2,3,7,8-TCDD.

To supplement the chemical results, the extensive RI included evaluation of Site physical characteristics and the potential sources of contamination. The body of data was used to evaluate the nature and extent of the contamination and a preliminary evaluation of contaminant fate and transport patterns. This RI Report documents the RI activities and presents the associated results, which will form a basis for evaluating the Site further during the Baseline Health and Ecological Risk Assessment (BHERA) and to address the Site contamination.

**Summary**

The RI was conducted in accordance with the DTSC-approved RI Workplan. In the RI Workplan, the seven-step data quality objectives (DQO) process was developed as outlined by the US EPA [EPA, 2000a]. Using this process as a basis, in addition to guidance provided in the CO, Hearthside developed sampling objectives for the RI and overall Fieldstone Property goals [GeoSyntec, 2003], which were discussed with and approved by the DTSC. A summary of how these goals and objectives were achieved follows:

> *RI Program Goal – Compile additional environmental data for Site assessment and remedial planning*

Goal was achieved. The data set was expanded by collecting another 741 environmental samples and analyzing for PCB and PCB congeners, dioxins and furans, PAH, and metals. As indicated by historical soil sample data, PCB-1260 was detected in samples from a localized portion of the Site. The chemical composition of the PCB-1260 detected in RI samples is consistent with historical sample data. The extent of PCB-impacted soil was estimated (Figure ES-2). Based on the RI data, the extent of the PCB-impacted soil is less than initially presented in the RI Workplan, but located in the same general area. The five groundwater samples did not contain detectable concentrations of PCB-1260 or PAH. The two stormwater samples did not contain detectable concentrations of PCB-1260.

> *Objective – Define nature of contamination by refining, if necessary, the constituents of concern*

Objective was achieved. PAH, metals, dioxins and furans were chemically analyzed and evaluated in addition to the primary constituent of concern, PCB-1260. Results confirm that PCB-1260 is the primary constituent of concern for this Site, and that sporadic detections above PRGs of additional constituents, specifically benzo[a]pyrene, dibenzo[a,h]anthracene, and OCDD, detected at low concentrations are co-located with PCB-1260 detections.

*Objective – Evaluate if contamination is co-located with debris piles or surface water drainage courses*

Objective was achieved. Based on the wide coverage of sampling locations from several debris piles across the Site, contamination above screening levels has been detected in an area of the Site in which the primary debris pile area is located. Based on sample data from drainage course soil samples, PCB-1260 has been deposited in parts of the swale along the berm on the northeastern side of the property.

*Objective – Evaluate if contamination is present in groundwater or accumulated stormwater*

Objective was achieved. PCB-1260 and PAH were not detected in groundwater samples, and PCB-1260 was not detected in the stormwater samples.

The RI data set that is presented in this RI Report augments the existing data to form a basis for future Site work, including the Baseline Health and Ecological Risk Assessment (BHERA), final Remedial Action Objectives (RAOs), and the Feasibility Study (FS). Chemical fate and transport, along with risk scenarios and exposure pathways, will be considered further in the BHERA. To preliminarily evaluate the fate and transport of the chemicals detected in Site soil, three preliminary transport mechanisms were considered in this RI Report: volatilization, fugitive dust, and stormwater flow. For the chemicals and concentrations detected at the Site, volatilization is insignificant due to physical properties (low vapor pressures), fugitive dust transport of PCB has been evaluated using the Cowherd model[3] and is considered

[3] The Cowherd model for evaluating fugitive dust is defined in the EPA Soil Screening Guidance Document [EPA, 1996a] and its Technical Background Document [EPA, 1996b].

insignificant, and stormwater samples from the northern portion of the Site do not suggest that stormwater in that area is transporting PCB.

**TABLE ES-1**
**CONSENT ORDER COMPLIANCE CHECKLIST**
**DOCKET No. HSA-CO 01/02-154**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**
**(Updated 18 June 2004)**

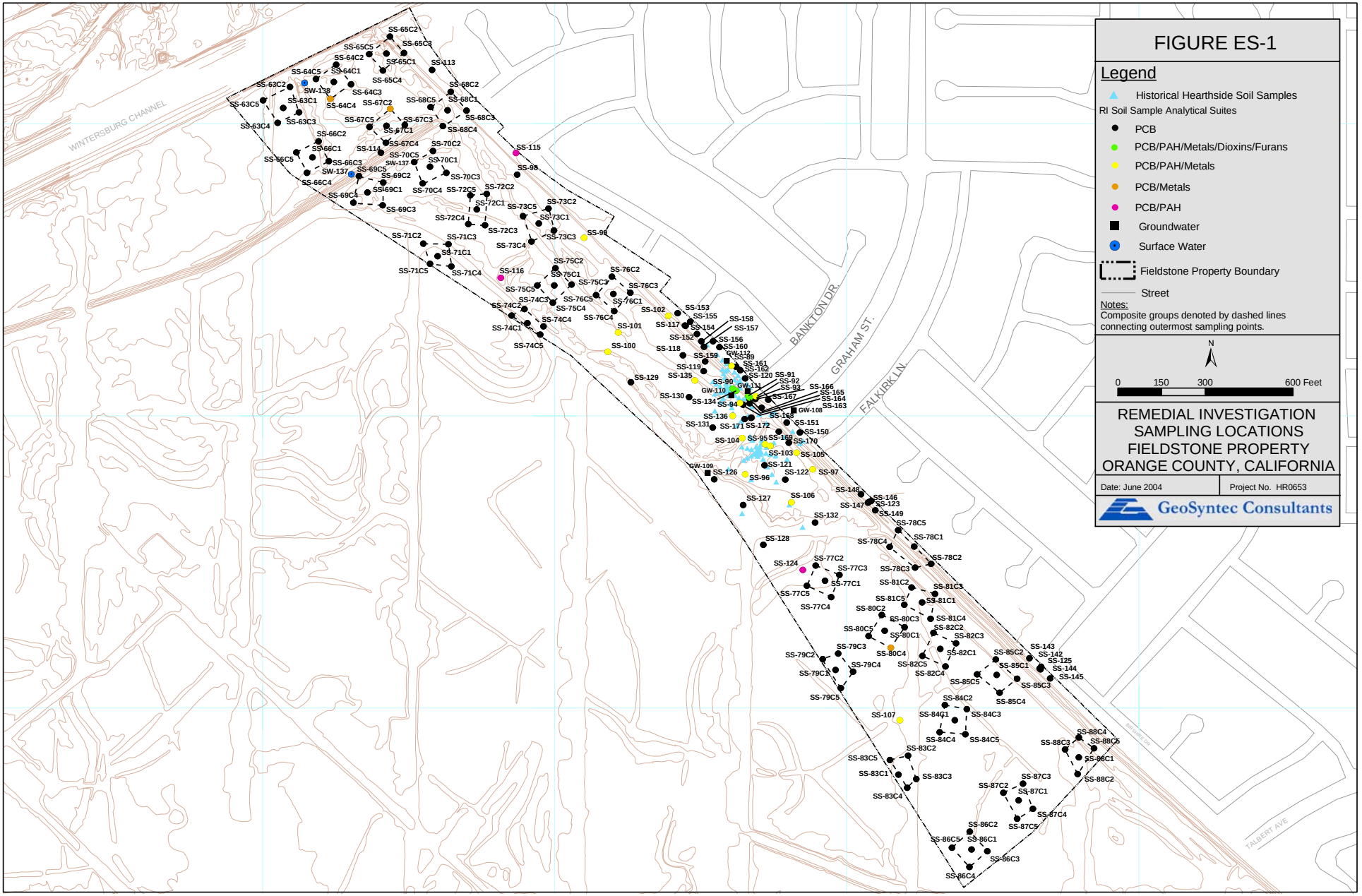
| DELIVERABLE NO. | ITEM | C.O. SECTION | COMPLIANCE DATE | SUBMITTAL DATE |
|---|---|---|---|---|
| 1a | Identification of Project Coordinator | 6.1 | 11 July 02 | 8 July 02 |
| 1b | Identification of Project Engineer | 6.2 | 16 July 02 | 11 July 02 |
| 2 | Remedial Investigation Workplan | 5.2.2 | 31 July 02<br>* Revised for submittal on 20 Feb 2003<br>** Second revision 23 May 2003<br>***Third Revision 21 July 2003 | 31 July 02<br>*20 Feb 2003<br>**23 May 2003<br>***21 July 2003 |
| 2a | Project Management Plan | 5.2.2 (a) | 31 July 02 | 31 July 02<br>*20 Feb 03<br>** 23 May 2003 |
| 2b | Health and Safety Plan | 5.2.2 (e) | 31 July 02 | 31 July 02<br>*20 Feb 03<br>** 23 May 2003 |
| 2c | Quality Assurance Project Plan | 5.2.2 (d) | 31 July 02 | 31 July 02<br>*20 Feb 03<br>** 23 May 2003 |
| 3 | Public Participation Plan | 5.8 | --- | 10 Feb 03 |
| 4 | Remedial Investigation Report | 5.5 | TBD<br>* Revised for submittal on 15 June 2004 | 9 Feb 04<br>*18 June 04 |
| 5 | Interim Screening and Evaluation Document | 5.3 | TBD | |
| 6 | Baseline Health and Ecological Risk Workplan | | TBD | |
| 7 | Baseline Health and Ecological Risk Assessment | 5.6 | TBD | |
| 8 | Feasibility Study Workplan | 5.2.2 | TBD | |

**Notes**: TBD = To Be Determined based on project progress.

**TABLE ES-1 (continued)**
**CONSENT ORDER COMPLIANCE CHECKLIST**
**DOCKET No. HSA-CO 01/02-154**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**
**(Updated 18 June 2004)**

| DELIVERABLE NO. | ITEM | C.O. SECTION | COMPLIANCE DATE | SUBMITTAL DATE |
|---|---|---|---|---|
| 9 | Feasibility Study Report | 5.7 | TBD | |
| 10 | Initial Study and Checklist | 5.9 | TBD | |
| 11 | RAP | 5.10 | TBD | |
| 11a | Responsiveness Summary | 5.10 | TBD | |
| 12 | Remedial Design | 5.11 | TBD | |
| 13 | Implementation Report | 5.13 | TBD | |
| 14 | O&M Workplan | 5.15 | TBD | |
| **PERIODIC SUBMITTALS** | | | | |
| MS-1 | Monthly Summary Report | 6.3 | 31 July 02 | 31 July 02 |
| MS-2 | Monthly Summary Report | 6.3 | 15 Sep 02 | 10 Sep 02 |
| MS-3 | Monthly Summary Report | 6.3 | 15 Oct 02 | 15 Oct 02 |
| MS-4 | Monthly Summary Report | 6.3 | 15 Nov 02 | 15 Nov 02 |
| MS-5 | Monthly Summary Report | 6.3 | 15 Dec 02 | 12 Dec 02 |
| MS-6 | Monthly Summary Report | 6.3 | 15 Jan 03 | 13 Jan 03 |
| MS-7 | Monthly Summary Report | 6.3 | 15 Feb 03 | 11 Feb 03 |
| MS-8 | Monthly Summary Report | 6.3 | 15 Mar 03 | 6 Mar 03 |
| MS-9 | Monthly Summary Report | 6.3 | 15 April 03 | 1 April 03 |
| MS-10 | Monthly Summary Report | 6.3 | 15 May 03 | 13 May 03 |
| MS-11 | Monthly Summary Report | 6.3 | 15 June 03 | 10 June 03 |
| MS-12 | Monthly Summary Report | 6.3 | 15 July 03 | 7 July 03 |
| MS-13 | Monthly Summary Report | 6.3 | 15 Aug 03 | 8 Aug 03 |
| MS-14 | Monthly Summary Report | 6.3 | 15 Sep 03 | 15 Sep 03 |
| MS-15 | Monthly Summary Report | 6.3 | 15 Oct 03 | 13 Oct 03 |
| MS-16 | Monthly Summary Report | 6.3 | 15 Nov 03 | 14 Nov 03 |
| MS-17 | Monthly Summary Report | 6.3 | 15 Dec 03 | 15 Dec 03 |
| MS-18 | Monthly Summary Report | 6.3 | 15 Jan 04 | 8 Jan 04 |
| MS-19 | Monthly Summary Report | 6.3 | 15 Feb 04 | 10 Feb 04 |
| MS-20 | Monthly Summary Report | 6.3 | 15 Mar 04 | 8 Mar 04 |
| MS-21 | Monthly Summary Report | 6.3 | 15 April 04 | 8 April 04 |
| MS-22 | Monthly Summary Report | 6.3 | 15 May 04 | 14 May 04 |
| MS-23 | Monthly Summary Report | 6.3 | 15 June 04 | 14 June 04 |

**Notes**: TBD = To Be Determined based on project progress.

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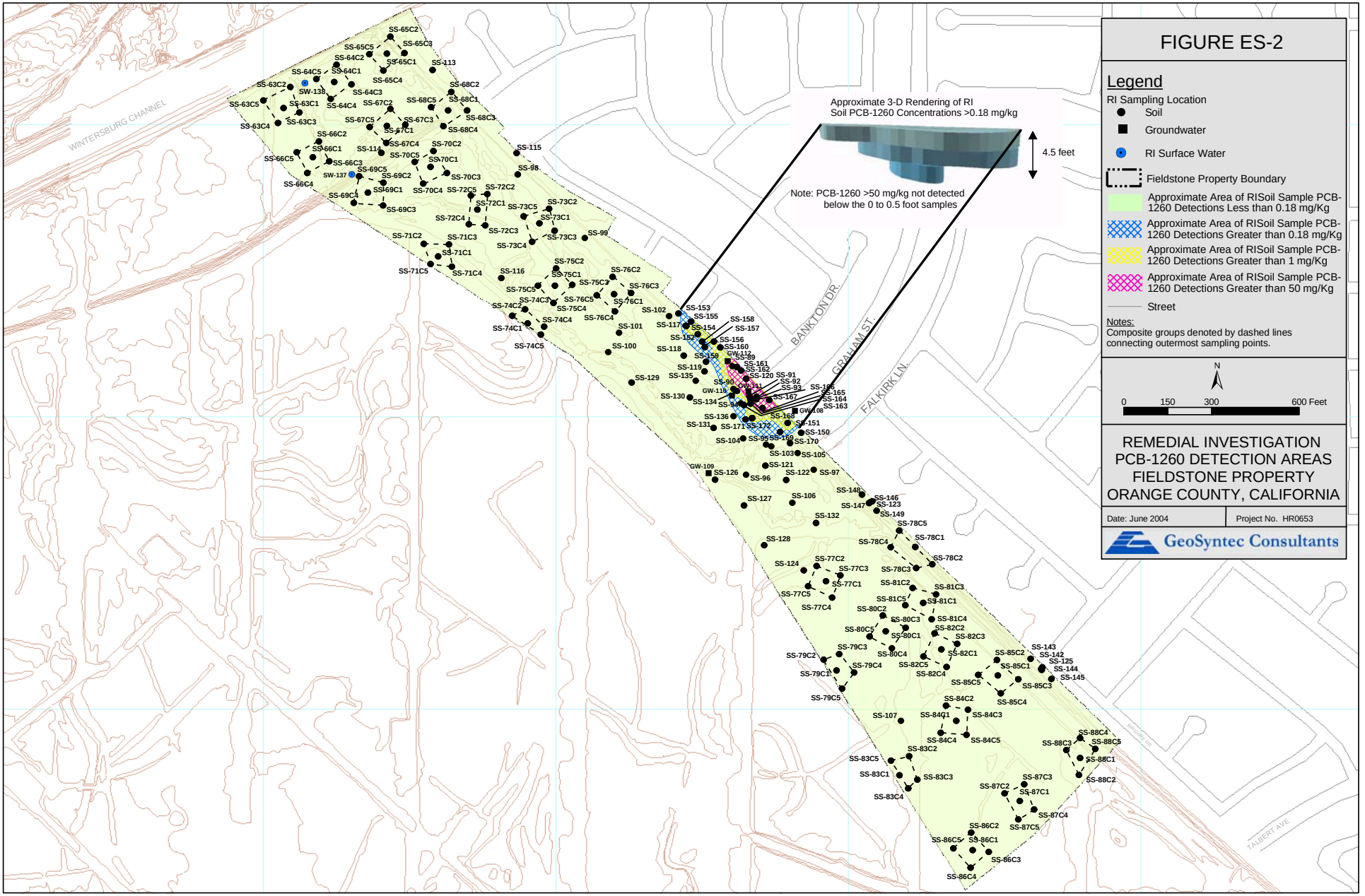


# FIGURE ES-2

## Legend

RI Sampling Location
- Soil
- Groundwater
- RI Surface Water

Fieldstone Property Boundary

Approximate Area of RISoil Sample PCB-1260 Detections Less than 0.18 mg/Kg

Approximate Area of RISoil Sample PCB-1260 Detections Greater than 0.18 mg/Kg

Approximate Area of RISoil Sample PCB-1260 Detections Greater than 1 mg/Kg

Approximate Area of RISoil Sample PCB-1260 Detections Greater than 50 mg/Kg

Street

Notes:
Composite groups denoted by dashed lines connecting outermost sampling points.

N

0 150 300 600 Feet

## REMEDIAL INVESTIGATION
## PCB-1260 DETECTION AREAS
## FIELDSTONE PROPERTY
## ORANGE COUNTY, CALIFORNIA

Date: June 2004 | Project No. HR0653

GeoSyntec Consultants

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FIGURES

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# 1. INTRODUCTION

## 1.1 Terms of Reference

The Fieldstone Property (the Site), located in an unincorporated area of Orange County, adjacent to Huntington Beach (see Figure 1-1), California, is under the regulatory oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). Hearthside Residential Corp. (Hearthside) voluntarily entered into a Consent Order with DTSC, Docket No. HAS-CO 01/02-154 (CO), which describes the regulatory process and Site work. As part of the work described in the CO, Hearthside submitted a Remedial Investigation (RI) Workplan for DTSC review and approval. Following DTSC approval of the RI Workplan, Hearthside implemented the RI under the direct oversight of the DTSC, which was present for much of the Site work. The RI was conducted in general accordance with the RI Workplan [GeoSyntec, 2003].

The CO specifies a list of the deliverables to be submitted by Hearthside, of which this RI Report is Deliverable No. 4. The deliverable list is summarized in Table 1-1. As outlined in Section 5.5 of the CO, this RI Report documents the RI that was implemented at the Site.

## 1.2 Project Goals

The goal of this project (i.e., Fieldstone Site Remediation) is to identify and address Fieldstone Site contaminants that were encountered during random sampling by the State of California and subsequent Site sampling. Site background information, including historical Site uses and investigations, was reviewed to design the RI Workplan [GeoSyntec, 2003]. The RI Workplan included a technical approach to meet the objectives outlined in the CO, including the collection of Site data to evaluate the nature and extent of chemicals, primarily polychlorinated biphenyl (PCB)-1260 (synonym Aroclor 1260), in Site soil, groundwater, and accumulated stormwater.

As part of the RI conducted in accordance with the DTSC-approved RI Workplan, 733 soil samples were collected and tested, five groundwater samples were collected and tested, and two stormwater samples were collected and tested. The RI

data set will augment the existing data to form a basis for the Baseline Health and Ecological Risk Assessment (BHERA) (Deliverable No. 7), and the Feasibility Study (FS) process.

## 1.3 Report Objectives

Section 5.5 of the CO requires that the RI Report contains certain components. The required components are summarized in Table 1-2. To address the required components, sections of this report:

- Summarize Site history;
- Review the sampling plan that was described in the RI Workplan;
- Document the RI;
- Present the RI data; and
- Evaluate the RI results.

## 1.4 Report Organization

The remainder of this RI Report is organized as follows:

- Section 2, *Background*, describes the Site setting and history;
- Section 3, *Contaminant Evaluation*, summarizes the sampling plan and the field procedures that were implemented during the RI;
- Section 4, *Nature and Extent of Contamination*, presents the RI analytical results to evaluate the nature of the contaminants and their spatial distribution at the Site;
- Section 5, *Contaminant Fate and Transport*, presents the preliminary evaluation of the potential for the contaminated soil media to impact human health and the environment; and

- Section 6, *Summary and Conclusions*, summarizes the RI results and how they will be used to bring Site resolution.

References, tables, figures, and appendices are included at the end of the RI Report.

# 2. BACKGROUND

## 2.1 General

PCB-1260 was detected in a Site soil sample collected in October 1998 during investigations related to the adjacent Bolsa Chica Lowland project [CH2M Hill, 2001]. Prior to the 1998 PCB-1260 detection, several studies of the Bolsa Chica Lowlands included activities on the Fieldstone Property. Subsequent environmental work was conducted to evaluate the Site in response to previous detections of PCB-1260. More detailed information on historical Site investigation work can be found in the following documents:

- Letter Report on Hydrogeologic Investigation, Easterly and Northerly Portions [LeRoy Crandall and Associates, 1980];
- Shallow Groundwater System of the Bolsa Chica Lowland [Bilhorn, 1986a];
- Rainfall, Evaporation, and Surface Water Drainage in the Bolsa Chica Lowland [Bilhorn, 1986b];
- Seasonal Variations in the Extent of Surface Water in the Bolsa Chica Lowland [Bilhorn, 1986c];
- Soil Data Report, Proposed Bolsa Chica Development [Woodward-Clyde Consultants, 1987];
- Observation Well Time Series, 1988 Water Year Readings [Bilhorn, 1988];
- Evaluation of Liquefaction Potential and Mitigation Measures for the Proposed Bolsa Chica Development [The Earth Technology Corporation, 1990];
- Phase I Environmental Assessment [Schaeffer Dixon Associates, Inc., 1991];

- Hydrogeologic Evaluation of Shallow Groundwater Conditions and Associated Impacts of Wetland Restoration [GeoSyntec, 2000];

- Ecological Risk Assessment for Bolsa Chica Lowlands Project [CH2MHill, 2001];

- Regulatory correspondence and meetings with the Orange County Health Care Agency (OCHCA) and the Bolsa Chica Technical Committee between 1 July 1999 and 2002 [GeoSyntec, 2002a]; and

- Remedial Investigation Workplan for the Fieldstone Property, including Appendices, which contained historical soil sampling data [GeoSyntec, 2003].

This section of the RI Report summarizes Site data and information, and the Site investigation history.

## 2.2 Geographic Setting

The Site encompasses approximately 42 acres and is located in an unincorporated area of Orange County, California, adjacent to the City of Huntington Beach. The Site location is shown in Figure 1-1. An aerial photograph of the Site taken in 1999 is presented in Figure 2-1. A Site map containing Site features is shown in Figure 2-2. The Site is located within the northern portion of the Seal Beach, California, United States Geological Survey (USGS) 7.5-minute quadrangle map (Township 5S, Range 11W, Section 28). The Site is bordered to the south and southwest by the Bolsa Chica Lowlands currently being operated as an oil production field, a residential neighborhood of Huntington Beach to the northeast, and the Wintersburg Channel and the Bolsa Chica Mesa to the northwest.

## 2.3 Geologic and Hydrogeologic Setting

The Site is located within the geomorphic feature known as the Bolsa Gap, bounded by the Bolsa Chica Mesa to the northwest and the Huntington Beach Mesa to the southeast as described by the California Department of Water Resources [DWR, 1968]. At the end of the Pleistocene epoch, the Bolsa Gap was incised deeply into early Pleistocene sediments at the modern coast by rivers that drained the inland Los Angeles sedimentary basin in response to a major decline in sea level. About 15,000 years ago, the sea level began to rise rapidly, causing coarse-grained channel sediments to deposit unconformably over the early Pleistocene sediments of the Bolsa Gap. Those coarse-grained channel deposits formed the Bolsa Aquifer approximately 11,700 years ago. With the submergence of the Bolsa Gap below the rising sea level and resulting transition from a high-energy to a low-energy depositional environment about 9,000 years ago, predominantly fine-grained floodplain sediments were deposited across the gap and formed the Bolsa Aquiclude, the Semi-perched Aquifer (shallow aquifer), and the present land surface [GeoSyntec, 2000]. The upper soil profile at the Site consists of predominantly silts and clays [GeoSyntec, 2000; Woodward-Clyde, 1987; Earth Tech, 1990; Bilhorn, 1986a]. Soil sampling results are summarized in Section 4 and shown on a Site transect that displays the general soil profile of the upper 30 ft (see Section 4.3.3).

The Site is adjacent to the active Newport-Inglewood fault zone, predominantly a right-lateral strike-slip fault zone paralleling the San Andreas Fault. The fault zone consists of multiple discontinuous strike-slip splays trending northwesterly across the Site. Although the fault zone is not exposed in the lowland, it was exposed with trenching in the bluffs of the Bolsa Chica Mesa to the northwest and in the Huntington Beach Mesa to the southeast [Freeman et al., 1992].

In the Bolsa Gap, the Bolsa Aquiclude, consisting of 25 to 40 ft of clays and silts, separates the Bolsa Aquifer from the semi-perched aquifer. The Bolsa Aquiclude reportedly thins toward the Bolsa Chica Mesa to the northwest. The Bolsa Aquifer occurs at a depth of approximately 80 ft, ranges in thickness from 5 to 40 ft, and consists of fine- to coarse-grained sand and gravel. The coastal portion of the Bolsa Aquifer located seaward of the Newport Inglewood fault has been impacted by sea water for many years, while groundwater inland of the fault has historically been of better quality [GeoSyntec, 2000]. However, fresh groundwaters of the area have

generally been degraded in areas extending up to 4,000 ft inland of the Newport Inglewood fault due to the effects of overdraft of the groundwater basin and disposal of brines from the Huntington Beach oil field since the 1920s [DWR, 1968]. The top of the semi-perched aquifer is the uppermost groundwater underlying the Site.

The semi-perched aquifer consists of silty fine- to medium-grained sand with thin lenses of tidal marsh and lagoonal organic sandy silts and clays and only minor lenses of coarse-grained sand. The thickness varies from 15 ft to 40 ft (7.6 m to 12.2 m) along the coast, and gradually thins inland to a thickness of approximately 5 ft where it pinches out. The horizontal hydraulic conductivity in the vicinity of MW-1 (see Figure 2-2), as calculated from a pumping test at MW-1, was reported to be 4.5 ft/day ($1.6 \times 10^{-3}$ centimeters/second (cm/s)). The water bearing zone is overlain by approximately 5 to 11 ft of a silt/clay (upper clay) unit with a vertical hydraulic conductivity, measured by geotechnical testing of drive samples collected from the upper clay, of approximately $4.0 \times 10^{-3}$ ft/day ($1.4 \times 10^{-6}$ cm/s) in the vicinity of MW-1. The hydraulic conductivities are expected to be lower beneath the neighborhood where the lithology is composed of finer grained soil and consists primarily of silts and clays [GeoSyntec, 2000].

Groundwater in the semi-perched aquifer occurs under unconfined to semi-confined conditions, and generally flows inland to the north and northeast within the Bolsa Chica Wetland, as reported by Bilhorn [1981, 1986a, 1986b, 1986c] and LeRoy Crandall and Associates [1980]. Although groundwater in the semi perched aquifer generally flows inland under the Bolsa Chica, an elongated depression in the water table exists in the vicinity of the Site where local groundwater flows seaward [GeoSyntec, 2000]. The groundwater surface at the time of the RI groundwater sampling (14 October 2003) is described in Section 4 of this RI Report. The 14 October 2003 groundwater surface was prepared using the measured groundwater levels from the RI sampling. The historical conditions are shown in the RI Workplan and were consulted to select appropriate groundwater sampling locations [GeoSyntec, 2003].

The Site is located in the Santa Ana River Basin. The Santa Ana Basin Water Quality Control Plan designates the Santa Ana Pressure Basin of the Santa Ana River Basin suitable or potentially suitable for municipal or domestic supply, agricultural supply, industrial service supply, and industrial process supply [SARWQCB, 1995]. Depth to uppermost groundwater at the Site is approximately 10

feet below ground surface (bgs) depending on local topography (approximately -8 ft MSL). From a water quality standpoint, the uppermost groundwater underlying the Site in the semi-perched aquifer is of minimal use [Heath, 1992]. The groundwater quality beneath the Site is characterized by high concentrations of salts [GeoSyntec, 2000]. Groundwater is not withdrawn for domestic or industrial uses due to the high levels of total dissolved solids (TDS) [SWRCB, 1988].

## 2.4 Surface Features

Site features are shown in Figure 2-2. The overall elevation of the Site is approximately mean sea level and is relatively flat. The Site topography undulates slightly (generally ±3 ft). The Site is undeveloped open space, containing seasonal ponds vegetated with native coastal salt-marsh shrubs and grasses. Other topographic features include a man-made soil berm constructed along the northeastern boundaries of the Site and random soil and debris piles (primarily concrete and asphalt). Scattered soil and debris piles are located Site-wide, however the primary debris pile area exists in the northeastern portion of the Site near the end of Graham Street, Bankton Drive, and Falkirk Lane. After reviewing aerial photographs of the Site covering several decades, and interviewing parties involved in the adjacent development, no major contributor to the debris piles was identified. The debris piles appear to be owed to several sources, potentially illicitly dumping various wastes at the street ends. The majority of the debris piles and the seasonal ponds are located within a fenced area of the Site. Figure 2-2 shows the primary debris pile area and other Site features., such as the fence, the topography, and the soil berm. The fence was first installed in 1999, subsequent to Site environmental investigations.

Four oil wells (North Bolsa wells 65A, 74A, 75, 85-1) have operated on the Site. These four wells were abandoned prior to 1986. The four former oil well locations are shown on Figure 2-2.

## 2.5 Climate

The climate at the Site is characterized by warm, dry summers, tempered by ocean breezes and mild winters. The average annual rainfall for the Site is

approximately 12 inches (in.) per year, which predominately occurs between November and April. Depending on the amount of annual precipitation, seasonal ponds may form in the low-lying portions of the Fieldstone Property. Average daily temperatures range from approximately 18 degrees Celsius (C) (64 F) in summer to 11 degrees C (52 F) in winter with an annual range between 1.7 and 38 degrees C (35 to 100 F). The prevailing winds are on-shore from the southwest. However, in fall and early winter strong, gusty winds from the northeast deserts can occur (known as a Santa Ana condition) [CH2M Hill, 2001]. Meteorological data from Huntington Beach weather stations are summarized in Table 2-1, which illustrates the mild climate conditions that characterize the Site.

## 2.6 Surface Water

The Site features are described in Section 2.4 and shown on Figure 2-2. As discussed in Section 2.5, precipitation at the Site contributes to seasonal ponds forming at the Site. During periods of high precipitation, water can accumulate in low areas of the Site. The surface water accumulates in various areas of the Site depending on the topography. Figure 2-2 shows areas of the Site where seasonal ponds form when there is sufficient precipitation. The resulting seasonal ponds usually dry up toward the end of the spring season.

Figure 2-2 shows the man-made soil berm constructed along the northeastern boundary of the Site. This surface feature generally serves to both contain stormwater run-off on the property (except on the landward side of the berm), and to reduce run-on from adjacent properties migrating onto the Site. Currently, surface water control features such as sand bags line a segment of the northeastern edge of the Site to impede off-Site surface water migration.

## 2.7 Site Operations

The Fieldstone Property ownership history and the history of oil field interests in the surrounding properties are presented in Table 2-2. Apart from minor improvements (e.g., the man-made soil berm shown on Figure 2-2), the Site has never been developed. Rather it has remained an unused and undeveloped parcel of property

except for limited use in agriculture and oil field operations. Available aerial photographs of the Site from 1927 to 1970 were reviewed. Copies of these photographs were provided to the DTSC for their independent assessment [GeoSyntec, 2002b]. These photos show that between approximately 1927 and 1960 the Site was primarily undeveloped land containing seasonal ponds. Circa 1960, the oil field development extended to the area to the south of the Site, with dirt roads being built to connect adjacent oil derricks. Four oil wells were installed at what is currently the Fieldstone Property (Figure 2-2). These wells were abandoned according to Department of Oil and Gas and Geothermal Resources (DOGGR) requirements prior to 1986 [GeoSyntec, 2003]. The oil field operations on adjacent parcels to the southwest continue to date.

In the early 1970s the existing neighborhood adjacent to the Site to the northeast was constructed. The construction was completed in phases. Grading and construction of the residential area adjacent to the Site occurred from approximately 1972 to 1976. During this time period, grading also occurred on parts of the Fieldstone Property and the soil berm was constructed.

## 2.8 Existing Site Data

A chronological summary of the investigations performed at the Site is presented in Table 2-3 and discussed in this section. Historical data is presented in Appendix A. A brief history of soil sampling and sample analysis performed at the Site includes:

- State of California State Lands Commission (SLC) random sampling performed in 1998 and focused sampling in 2000 by consultants (CH2M Hill); and

- Hearthside sampling performed in 1999, 2000, and 2001 by consultants (PIC and GeoSyntec).

The Bolsa Chica (Lowland and Upland portions) has been the focus of environmental investigation and research for many years. SLC hired consultants in 1997 to conduct environmental sampling due to their Bolsa Chica land transaction with Signal Landmark (see Table 2-2), and to contribute data to ongoing studies [CH2MHill,

2001]. Much of the SLC-commissioned sampling was founded upon potential environmental areas of concern within the Bolsa Chica Lowland identified in a Phase I and limited Phase II Environmental Site Assessment performed by Schaefer Dixon Associates [1991]. For example, cleanup and release (CAR) Site 26 (see Figure 2-2) was identified for sampling based on aerial photography review based on these environmental site assessments. Soil samples were initially collected from within the Fieldstone Property in 1998 during random testing conducted as part of the Bolsa Chica Lowlands ecological risk assessment [CH2MHill, 2001], and tested for the parameters identified in Table 2-3. Sample collection in 1998 was allowed on the Fieldstone Property (which is currently not owned by SLC) because the parcel has been planned for incorporation into the Bolsa Chica Lowland restoration.

The random sampling at the Site conducted in October 1998 indicated that 2.8 milligrams per kilogram (mg/kg) PCB was detected in R47C1-1 (Figure 2-2), a composite soil sample made up of four discrete Cell 47 samples collected on the Fieldstone Property from 0 to 6 in. bgs [CH2MHill, 2001]. PCBs were not detected in other samples collected from the Site, including CAR 26, which was eliminated from the list of potential areas of concern based on sample results from this area (see Appendix A-3). Due to elevated PCB concentrations in the R47C1-1 samples, additional investigations were conducted with a focus on PCBs at the discrete components of the R47C1-1 sample [GeoSyntec, 2003]. These data are included in the data analysis performed as part of this RI.

R47C1-1 was a composite of four discrete sampling locations (RD-47-01, RD-47-02, RD-47-03, and RD-47-04). Subsequent to the PCB-1260 detection in R47C1-1, confirmation sampling was performed on 9 April 1999 by Hearthside, which also indicated the presence of PCB in soil samples from the Site (see Appendix A-4) [PIC, 1999]. The confirmation sampling was performed by collecting discrete samples from each of the four locations, RD-47-01 through RD-47-04, and analyzing them for PCBs. PCB was detected in two of the four locations, RD-47-03 (at 7.63 mg/kg) and RD-47-04 (at 0.163 mg/kg). PCBs were not detected in the remaining two locations, RD-47-01 and RD-47-02 (see Appendix A-4).

To further evaluate the nature and extent of PCBs in the areas of RD-47-03 and RD-47-04, Hearthside collected additional soil samples in August and October of 1999 under the oversight of the Orange County Health Care Agency (OCHCA). This

testing program included analyses for PCB Aroclors, which are common PCB mixtures, and certain PCB congeners, which are individual PCB species, by EPA Method 8080A. To evaluate the extent of PCB in the near-surface (i.e., 0.5 to 1 ft) and deeper soils (1.5 to 2 ft, 3.5 to 4 ft, and 6 to 6.5 ft), soil samples were collected at the various discrete depths. The sample locations were arranged in an array surrounding the RD-47-03 and RD-47-04 locations where SLC soil samples initially indicated detectable levels of PCB. Figure 2-2 shows the RD-47-03 and RD-47-04 locations. Soil was sampled from locations extending radially up to approximately 200 ft from the RD-47-03 and RD-47-04 locations during the August and October 1999 sampling events. PCB-1260, which is also known as Aroclor 1260 and was the Aroclor mixture detected in SLC samples, was detected in several of the samples. The laboratory results ranged in concentration from non detect at 0.033 mg/kg to 3,220 mg/kg at the 0.5 to 1 ft depth. PCB-1260 was not detected in the samples from below the 0 to 0.5 ft depth. Appendix A-4 contains data summary tables and data maps showing Hearthside sampling results.

Hearthside performed additional testing in April 2001 and November 2001 to further evaluate the extent of the PCB in Site soil. Soil was sampled from locations extending up to approximately 300 ft from the RD-47-03 and RD-47-04 locations during the 2001 sampling events. Additionally, the November 2001 sampling event included collecting samples from near the northeastern property boundary near where Bankton Drive, Graham Street, and Falkirk Lane intersect the Site. PCB-1260 was encountered in soil samples collected between depths of 0 and 4.5 ft bgs at concentrations ranging from 0 to 750 mg/kg. Laboratory results from these events were previously included in Hearthside's response to the DTSC's request for information in February 2002, and also in the RI Workplan [GeoSyntec, 2003]. Historical Hearthside soil samples were analyzed by Advanced Technology Laboratories (ATL) of Signal Hill, California, a laboratory certified by the State of California Department of Health Services. Data collected during the Hearthside investigation are summarized in the RI Workplan and tabulated in Appendix A-4. The samples were analyzed on a location-specific basis for the following:

- PCB by EPA Methods 8080A and 8082;
- Total Recoverable Petroleum Hydrocarbons (TRPH) by EPA Method 418.1; and

- Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270C.

During these sampling events, 176 soil samples were collected by GeoSyntec personnel and 136 of these samples were analyzed for one or more of the analytes listed above. The samples were analyzed in phases. The samples were selected for analysis initially from a wide grid pattern (e.g., approximately 60 ft grid spacing), and if results indicated further delineation was necessary, the samples collected from the narrower grid spacing (i.e., less than 12 ft) were analyzed.

Results indicated that PCB-1260 was found primarily in soils located from 0 to 0.5 ft bgs in an area approximately two acres in extent. In most locations, PCB-1260 was not detected in deeper soils. However, a few samples at the 2 to 2.5 ft and 4 to 4.5 ft depths did have detectable concentrations of PCB-1260. Based on the historical data, soil containing detectable levels of PCB-1260 is located near a densely-spaced accumulation of debris in the primary debris pile area located near the street ends.

During historical sampling, select Hearthside samples were analyzed using EPA 8270C for SVOCs. SVOCs were not detected in the tested samples [GeoSyntec, 2003, and Appendix A-4].

As PCB may exist in manufactured products as part of an oil matrix, TRPH analysis has also been performed on historical samples. Low levels of TRPH were detected in Site soil samples. These TRPH concentrations were lower than expected and additional TRPH evaluations were not performed. The low TRPH concentrations may indicate the PCB contamination occurred several years ago, resulting in significant weathering of the petroleum components.

## 2.9 Regulatory Background

PCB-1260 was initially detected in soil samples collected from the Site in 1998. Concurrently, additional evaluations were conducted and discussions held regarding the mitigation of the PCB-1260 in Site soil. Hearthside has worked with various agencies to evaluate nature, extent, and potential sources of the PCB to develop a soil mitigation plan. The SLC discussed the data with representatives of Hearthside

and with the Bolsa Chica Technical Committee (Technical Committee) in the first quarter of 1999. The Technical Committee is made up of representatives from various state and federal agencies including the Regional Water Quality Control Board (RWQCB), California Department of Fish and Game (DFG), the US Fish and Wildlife Service, and the US EPA. Following the discussion of the PCB contamination at the Technical Committee, Hearthside initiated conversations with the OCHCA, the local lead environmental agency for Bolsa Chica site-specific investigation and closure activities used by the Technical Committee. OCHCA transferred regulatory oversight to the DTSC in 2002, therefore DTSC is the lead agency for the Fieldstone Property.

# 3. CONTAMINANT EVALUATION

## 3.1 Introduction

Hearthside and DTSC collaborated to prepare the RI Workplan [GeoSyntec, 2003]. Hearthside conducted the RI under DTSC oversight, and DTSC representatives accompanied GeoSyntec personnel during field activities. Hearthside conducted the RI in general accordance with the RI Workplan [GeoSyntec, 2003], the EPA's SW-846 guidance document *Test Methods for Evaluating Solid Waste* [EPA, 1998], and other method-specific guidance as applicable. This section describes the technical approach and the RI that was performed at the Site. Soil, groundwater, and proposed surface water sampling locations are shown on Figure 3-1. The samples that were collected and their associated analytical methods are presented in Table 3-1.

## 3.2 Sampling Plan

### 3.2.1 General

Objectives to address data gaps are described in the RI Workplan, and included:

- Evaluate the nature and extent of PCBs within previously unsampled, uncharacterized areas of the Site;
- Evaluate arsenic and lead in the vicinity of two historical sampling locations [CH2MHill, 2001];
- Evaluate the potential for co-location of PCB, PAH, and metals with debris piles observed at the Site;
- Evaluate the nature and extent of PCBs within drainage courses at the Site;

- Confirm the presence/absence of PCBs at previous soil sample locations. Evaluate the potential co-location of PAH and Title 22 metals with PCB, and vertically profile the soil PCB-1260 concentrations in the upper 2.5 ft of confirmation locations;

- Evaluate the potential for PCB co-location with asphalt from a Site debris pile;

- Evaluate the potential concentrations of different PCB congeners and dioxins and furans in certain soil samples that contains PCB;

- Evaluate the presence/absence of PCBs and PAH in the underlying semi-perched groundwater; and

- Evaluate the presence/absence of PCBs accumulated stormwater run-off at the Site.

To address the data gaps identified in the RI Workplan, RI implementation included:

- Analyzing composite and discrete soil samples from within previously uncharacterized areas of the Site for PCBs;

- Analyzing certain samples from near the historic arsenic and lead detections for Title 22 metals. These samples were from components of the composite samples;

- Analyzing soil samples for PCBs, PAH, and Title 22 metals from debris piles observed at the Site;

- Analyzing soil samples from within drainage courses at the Site for PCBs;

- Analyzing soil samples from previous soil sampling locations [GeoSyntec, 2003] for PCBs. Soil samples from the top 2.5 ft of soil were also analyzed for PAH and Title 22 metals. Separate soil

samples were collected near these locations to analyze for PCB in samples collected from every 0.5 ft to 2.5 ft deep;

- Analyzing an asphalt sample from a Site debris pile for PCBs;
- Analyzing five soil samples with the elevated PCB-1260 results for PCB congeners and dioxins and furans;
- Analyzing five samples from the underlying semi-perched groundwater for PCBs and PAH; and
- Impending analysis of stormwater run-off samples for PCBs.

Table 3-1 summarizes the RI samples and the associated analytical methods. This section describes the RI sampling and analysis activities.

### 3.2.2 Soil Samples

The soil sampling described in the RI Workplan was implemented in September 2003 after the DTSC approved the RI Workplan in August 2003. In November 2003, following review of the analytical data, Hearthside proposed to collect additional soil samples. After reviewing the existing analytical data, DTSC also recommended additional sampling. On 19 December, Hearthside submitted a supplemental RI soil sampling workplan to DTSC (Appendix B). DTSC verbally approved the supplemental RI soil sampling workplan on 19 December with a follow-up approval letter [DTSC, 2003]. The additional soil sampling was performed to provide data to characterize the soil surrounding previous RI sample detections, refine the soil data at the edges of the area with PCB-1260 detections, refine the vertical distribution profile of PCB-1260 in Site soil, and evaluate the differences between historical and RI data. On 22 December, DTSC transmitted their formal approval letter for the additional soil sampling. On 23 December 2003, Hearthside implemented the additional soil sampling workplan under the oversight of DTSC personnel.

The sampling and analysis plan, incorporating both the September and December 2003 sampling events, is summarized in Table 3-1. The sampling plan consisted of a combination of discrete and composite soil samples as shown on Figure 3-1. From the 42-acre Site, 733 soil samples were collected and analyzed. One asphalt sample was collected from a debris pile and analyzed.

### 3.2.3 Groundwater Samples

RI groundwater sampling was implemented in October 2003. Sample locations are shown on Figure 3-1. The sample and analysis plan is summarized in Table 3-1. Groundwater samples were collected from existing wells and temporary monitoring locations to evaluate the groundwater quality underlying the Site. Five groundwater samples were collected and analyzed as follows:

- Groundwater samples GW-108 and GW-109 were collected from P-9 and MW-2, two existing permanent groundwater monitoring locations (see Figure 3-1); and

- Based on soil sample analytical results, groundwater samples were also collected from 3 temporary locations installed in the area with elevated PCB-1260 soil concentrations (see Figure 3-1).

### 3.2.4 Surface Water Samples

RI surface water sampling was scheduled for implementation following stormwater accumulation on the surface of the Site. The Site was monitored regularly for several months in late 2003 and the first few months of 2004. Several rainstorms occurred during those months. However, stormwater did not accumulate in sufficient amounts to sample until 1 April 2004, when stormwater accumulated in planned sample location SW-137 (see Figure 3-1) and in another area (sample designation SW-138). Stormwater samples were collected from these locations on 1 April 2004 and submitted for PCB analysis according to Table 3-1.

### 3.2.5 Field Procedures

A detailed description of field procedures is in Appendix B. Deviations to the sampling plan presented in the RI Workplan are summarized in Table 3-2. A differential global positioning system (DGPS) was used to assign coordinates to the sampling locations, which are shown on Figure 3-1. DGPS specifications are documented in Appendix B.

Documents and other guidance were consulted for proper procedures, including:

- A Site-specific health and safety plan (HASP) [GeoSyntec, 2003];
- California Environmental Protection Agency, Drilling, Coring, Sampling and Logging at Hazardous Substance Release Sites [Cal-EPA, 1995a].
- United States Environmental Protection Agency, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA [EPA, 1998].
- California Environmental Protection Agency, Hydrogeologic Characterization of Hazardous Substance Release Sites [Cal-EPA, 1995b].
- California Department of Water Resources, Assurance Technical Document 2: Sampling Manual for Environmental Measurement Projects [DWR, 1994].
- California Environmental Protection Agency, Representative Sampling of Groundwater for Hazardous Substances [Cal-EPA, 1995c].
- United States Environmental Protection Agency, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual [EPA, 2001].

### 3.2.6 Investigation Derived Waste Management

The analytical laboratory was responsible for disposing of the samples in their custody. Investigation derived wastes (IDW) such as excess soil cuttings, heavily contaminated equipment, and equipment rinsate generated during the RI process were temporarily stored in 55-gallon drums inside the fenced area of the Site. The 55-gallon drums were labeled according to their contents. The waste drums were sampled to evaluate their constituent concentrations and disposed of according to analytical results by Belshire Environmental, on behalf of Hearthside. The solid waste was disposed of at TPS Technologies Inc., which is a thermal treatment facility in Adelanto, California. The liquid was disposed of at Demenno Kerdoon, which is a recycling facility in Compton, California. The drums were disposed of less than ninety days following their accumulation start date.

### 3.2.7 Data Management and Validation

In the RI Workplan, data quality objectives (DQO) were developed using EPA guidelines [EPA, 2000a]. The RI data were evaluated within the framework of the Site-specific DQO, the RI Workplan and Quality Assurance Project Plan for the Site [GeoSyntec, 2003], and other pertinent guidance [Cal-EPA, 1994, EPA, 1988, EPA, 2000b].

A summary of the implemented data evaluation procedures as prescribed by the RI Workplan is described in Appendix C. According to the Fieldstone Quality Assurance Plan, the primary DQO at the site is to evaluate the Fieldstone property with respect to contamination and to provide quantitatively and qualitatively valid data for use as inputs in models used to make risk based decisions for handling contamination at the Site [GeoSyntec, 2003]. To meet this objective, data for the Fieldstone Property were verified and validated according to the following guidance documents:

- USEPA National Functional Guidelines for Inorganic Data Review, July 2002a;

- USEPA National Functional Guidelines for Organic Data Review, October 1999; and

- EPA QA/G8 Guidance on Environmental Data Verification and Data Validation, November 2002b.

Data verification is the process for evaluating the completeness, correctness, consistency, and compliance of a data package against a standard or contract. Validation is the process of data assessment in accordance with EPA regional or national functional guidelines, or project-specific guidelines. Data that do not meet all of the measurement requirements do not necessarily make the overall data set invalid.

The overall data assessment included an evaluation of the following data quality parameters; accuracy, precision, completeness, representativeness, and comparability. The overall data verification and validation process performed on these level II data indicated that with the exception of three samples for Method 8082 analysis, the remaining data reviewed were generally within the specified method criteria. In accordance with EPA protocol, some of the data are acceptable for use as qualified (see Appendix A for specific qualifier language, e.g., "J" flagging for trace detections). Three samples that did not meet ciriteria were:

- Rinsate sample 091703 (Lab No. 03-08910-57) had a surrogate recovery of less than 10% for Method 8082 analysis. All of the analytes except for PCB-1260 were reported as less than the PQL and were "R" qualified as rejected. The positive result for PCB-1260 and Total PCB summation were "J" qualified as estimated.

- Rinsate sample 091603-2 (Lab No. 03-08874-87) had a surrogate recovery of less than 10% for Method 8082 analysis and was not reextracted. All of the analytes were reported as less than the PQL and were "R" qualified as rejected.

- Groundwater sample GW-110 (Lab No. 03-09866-2) had a surrogate recovery below control limits for the Method 8082 analysis. The non-detect result for PCB-1260 less than 0.2 micrograms per liter (µg/l) of PCB was "J" qualified as estimated.

- Groundwater sample GW-111 (Lab No. 03-09866-3) had a surrogate recovery below control limits for the Method 8082 analysis. The non-detect result for PCB-1260 less than 0.2 micrograms per liter (µg/l) of PCB was "J" qualified as estimated.

- Groundwater sample GW-112 (Lab No. 03-09866-4) had a surrogate recovery below control limits for the Method 8082 analysis. The non-detect result for PCB-1260 less than 0.2 micrograms per liter (µg/l) of PCB was "J" qualified as estimated.

- Composite sample SS-76-A (Lab No. 03-08874-87) had a surrogate recovery of less than 10% for Method 8082 analysis and the reextraction grossly exceeded the holding time and the surrogate value was still unacceptably low. All of the analytes were reported as less than the PQL and were "R" qualified as rejected.

# 4. NATURE AND EXTENT OF CONTAMINATION

## 4.1 General

Soil ,groundwater, and surface water samples were collected to evaluate the nature and extent of the contamination. Samples were analyzed by the laboratory for target analytes according to the RI Workplan approved by the DTSC [GeoSyntec, 2003]. Analytical laboratory reports from the RI are included in Appendix A (A-1 and A-2). The location-specific target analytes were selected based on Site history and included PCB-1260, PAH, metals, dioxins and furans, and PCB congeners. This section presents the results of the RI and includes a comparison of results with site-specific chemical screening concentrations.

## 4.2 Contaminant Sources

Section 5.5 of CO specifies that the RI Report include the identification of contaminant sources, if possible. In Section 2.7 of this RI Report, the Site's ownership and operational history is described. In Section 2.8, previous Site investigations are summarized. Information from Sections 2.7 and 2.8 that is relevant to the contaminant source investigation includes:

- The Site has largely consisted of undeveloped open space, except for limited portions of the site that were used for short-term oil exploration and staging of equipment during the development of the adjacent residential neighborhoods;
- The Site is currently undeveloped, except for minor improvements;
- Historical aerial photo review does not provide definite answers into the origin of Site soil contamination;;
- Oil wells at the Site were abandoned according to DOGGR requirements prior to 1986;

- Several streets terminate at the boundary of the Fieldstone property and appear to have provided access for depositing refuse materials at the Site; and

- The initial PCB-1260 detection from a Site soil sample occurred as the result of random sampling and not as part of environmental work to address specific contamination.

Based on a review of historical data and observations made in the field during the RI, no primary sources (i.e., leaking storage tanks or shipping drums related to Site operations) have been identified at the Site. Therefore, the possibility of secondary sources (e.g., illicit dumping of contaminated soils) was considered. Note that the soil data, which are evaluated in the following sections, are consistent with a historic illicit dumping of contaminants, previously cited as the likely origin of PCB at the Site [GeoSyntec, 2003].

## 4.3 Vadose Zone Soils

### 4.3.1 Screening Process and Criteria

To evaluate the results of soil sample chemical analyses, sample chemical concentrations were compared to site-specific and regulatory screening criteria. Comparison of Site data to these screening criteria provides an initial indication of the potential need for further action (e.g., remediation), and to define the approximate extent of the Site exceeding the criteria. Although the screening criteria incorporate risk-derived chemical concentrations for both human and ecological receptors, comparison to these values does not constitute a site-specific risk assessment. The data will be evaluated further during the implementation of the BHERA, as needed.

The screening criteria used in this evaluation for PCB-1260, PAH, dioxins and furans, and metals include:

- The preliminary soil screening concentration for PCB-1260 of 0.18 mg/kg based on ecological risk[4];

- US EPA (Region IX) Preliminary Remediation Goals (PRG) based on human health risk (e.g., PCB-1260 residential PRG of 0.22 mg/kg);

- Toxic Substances Control Act (TSCA) cleanup level for PCB in high occupancy areas of 1 mg/kg; and

- State of California waste criteria (California Code of Regulations – Title 22 (CCR T22)), based on hazardous classification (e.g., PCB-1260 concentration of 50 mg/kg).

The specific screening concentrations of each constituent are included, where appropriate, on the data summary tables for reference (Tables 4-2 through 4-4). The chemical analytical results from the RI sampling in excess of these screening criteria are also shown on Figures 4-1 through 4-12. The data exceeding screening criteria are retained for further analysis in the BHERA and remedial action phases of the project.

In addition to the screening concentrations listed above, a screening concentration range for the inhalation of fugitive dust was also developed for PCB-1260 following the approach presented in the EPA Soil Screening Guidance Document [EPA, 1996a]. Although the BHERA will include risk screening, the fugitive dust calculations were performed to assess the potential need to collect air samples as part of the RI work. The calculated screening concentration for inhalation of fugitive dust at this Site is between 3,300 and 5,600 mg/kg of PCB-1260 as described below.

The PCB-1260 soil screening concentration for inhalation of fugitive dust was calculated using the Cowherd model. The Cowherd model is presented in the soil screening guidance [EPA, 1996a] along with conservative default values for the model parameters provided in the accompanying Technical Background Document [EPA,

[4] The most conservative screening concentration (0.18 mg/kg) was originally provided by DTSC prior to submittal of the RI Workplan based on preliminary assessment of ecological screening values.

1996b]. A summary of the model, a listing of the input parameters, and the associated results are included in Table 4-1. Model assumptions and site-specific inputs include:

- Residential exposure factors [EPA, 1996a];
- Default values for the particulate emission factor [EPA, 1996b];
- A source size ranging from 0.5 to 2 acres in the Los Angeles Region, with the calculated screening value representing the average soil concentration spread over the surface of this area (a conservative estimate chosen to represent the contaminated surficial soil area in accordance with guidance [EPA, 1996b]); and
- PCB toxicity values from the EPA Region IX PRG tables [EPA, 2002].

A summary of the soil sample chemical data is presented in the following section, with individual chemical summaries (i.e., PCBs, PAH, dioxin and furans, and metals) presented in Sections 4.3.3 through 4.3.6.

### 4.3.2 Data Summary

Soil sampling procedures are summarized in Section 3.2 and Appendix B. The soil sampling locations are shown in Figure 3-1; analytical tests performed are shown in Table 3-1. Analytical laboratory reports from the RI are included in Appendix A-1. PCB-1260 analytical results are summarized in Table 4-2, PAH results are summarized in Table 4-3, and CCR T22 metal CCR T22 results are summarized in Table 4-4. Based on the data presented in Tables 4-2 through 4-4 and Figures 4-1 through 4-13:

- PCB-1260 is the primary contaminant at the Site;
- PCB-1260 detected in soil samples collected during the RI above the most conservative screening concentration, 0.18 mg/kg, is concentrated in an area of approximately one to two acres acre along

the northeastern boundary, within the upper 4.5 ft of Site soil (i.e., Area of Concern). This area is currently fenced, restricting public access;

- There is good spatial correlation between historical and RI soil results. The figures in Appendix A (Figures A-4-1, A-4-2 and A-4-3) present historical analytical data in the Area of Concern, and Appendix A-5 describes the combination of historical and RI data;

- Based on the soil sample results, air samples were not needed for screening (i.e., results were well below the calculated screening value); and

- Target analytes, other than PCB-1260, that were detected in soil samples above screening concentrations (i.e., residential PRGs) are located in the area where PCB-1260 was detected above 0.18 mg/kg (specifically sporadic detections of PAH compounds benzo[a]pyrene and chrysene, and dioxin compound OCDD were detected above their respective screening concentration).

### 4.3.3 Polychlorinated Biphenyls

Due to the history of PCB detections in Site soil samples, each soil sample collected as part of this RI was analyzed for PCBs and compared to the screening concentrations (0.18 mg/kg ecological, 0.22 mg/kg EPA PRG-residential for human health, 1 mg/kg TSCA cleanup level, and 50 mg/kg CCR T22 hazardous material criterion). Additionally, an asphalt sample from a large debris pile in the Area of Concern was analyzed for PCB-1260 to evaluate the potential for PCB-1260 co-location with asphalt within that large debris pile. Results of the soil and asphalt samples are discussed later in this section. Historical data are presented in Appendix A-4, including plots of PCB-1260 concentration with depth. PCBs, PCB Aroclor mixtures, and individual PCB congeners were also tested as part of this RI. As expected based on historical sampling, RI laboratory results confirmed that PCB-1260 is the Aroclor mixture present in Site soil. In total, 733 Site soil samples were collected from up to 6.5 ft bgs (see Table 3-1). Of these, 102 soil samples contained detectable levels of

PCBs. Of the 102 soil samples, 49 results were greater than the 0.18 mg/kg screening concentration. Those 49 soil samples were collected from within the Area of Concern. This Area of Concern is shown in the figures. This Area of Concern is located near where Graham Street, Bankton Drive, and Beck Circle intersect the Site. This Area of Concern at the street ends coincides with primary debris pile area..

The PCB-1260 results are presented graphically as follows:

- Figure 4-1 presents RI soil sample PCB-1260 results from the 0 to 0.5 ft bgs horizon.
- Figure 4-2 presents a focused area of the Site where PCB-1260 results were greater than 0.18 mg/kg in 0 to 0.5 ft bgs samples.
- Figure 4-3 presents RI soil sample PCB-1260 results from 2 to 2.5 ft bgs horizon.
- Figure 4-4 presents a focused area of the Site where PCB-1260 results were greater than 0.18 mg/kg in 2 to 2.5 ft bgs samples.
- Figure 4-5 presents RI soil sample PCB-1260 results from 4 to 4.5 ft bgs horizon.
- Figure 4-6 presents RI soil sample PCB-1260 results from 6 to 6.5 ft bgs horizon.

Based on the results shown in Figures 4-1 to 4-6, the PCB-1260 detections appear to be confined to a small portion of the Site (the Area of Concern is shown in larger scale on Figures 4-2 and 4-4). Figures 4-7 through 4-10 show Site features and cross-section locations. The Area of Concern is also shown on Figure 4-7 for reference. Cross-sections are shown in Figures 4-8, 4-9, and 4-10, which illustrate PCB-1260 vertical distribution in Site soil samples. The figures are color-coded based on the associated PCB-1260 analytical results. In addition, Figure 4-13 shows the average PCB concentration in RI samples versus depth within the Area of Concern. The maps and cross-sections illustrate trends of PCB-1260 distribution at the Site that include:

- RI Soil samples collected from the 0 to 0.5 ft depth exhibited the highest PCB soil concentrations. The average concentration of PCB-1260 in these surficial soil samples is approximately 9.7 mg/kg. The highest PCB-1260 detection of 590 mg/kg was from the 0 to 0.5 ft bgs depth (soil sample location SS-166).

- Only six of the RI soil samples had PCB-1260 results that were greater than 50 mg/kg, the CCR T22 hazardous waste criterion. These samples were collected from an approximately 0.2-acre area within the Area of Concern. The 0.2-acre area is also shown on the figures.

- Results from discrete RI soil samples collected within drainage areas between the berm and northeastern property boundary indicated the presence of PCB-1260 above the 0.18 mg/kg screening concentration at four sample locations (SS-120, 152, 154, and 155) and detectable concentrations of PCB-1260 below the screening concentration in clusters around these sample locations.

- Consistent with historical Site soil sampling, the highest PCB-1260 concentrations are relatively localized. PCB-1260 detections are concentrated along the northeastern Site property boundary near the ends of Graham Street and Bankton Drive. PCB-1260 concentrations rapidly decrease with distance from this area. PCB-1260 analytical results from the RI suggest that the area where samples with concentrations above 0.18 mg/kg is approximately one acre (see Figures 4-1, 4-2, and 4-12).

- PCB-1260 was not detected in the composite Site soil samples from areas of the Site where PCB sampling had previously not been performed (approximately 98% of the Site).

- In areas where surficial samples contained detectable PCB-1260, concentrations substantially decrease as depth increases, even in the areas associated with the highest concentrations. The one-acre Area of Concern is for the surficial contamination, this area decreases

significantly with increasing depth (i.e., at 4.5 ft bgs the Area of Concern is about 0.3 acres, see Figure 4-5). No samples with PCB-1260 concentrations above 0.18 mg/kg were collected from below 4.5 bgs.

- The asphalt sample (SS-173 collected near SS-172 on Figure 4-2)) was reported to contain 2.4 mg/kg of PCB-1260. Although 2.4 mg/kg is above screening criteria, it is similar to other PCB-1260 detections in soil in that area. The asphalt result indicates that PCB-1260 is not generally and always co-located with the presence of debris piles evident across the site, but rather with the primary debris pile area.

- Soil sample concentrations of the magnitude identified in the previous sampling efforts (specifically the potentially anomalous value of 3,220 mg/kg in a sample collected from 0.5 ft to 1 ft bgs) were not observed in the RI sampling performed during September 2003. However, the surficial samples during the September 2003 sampling round were from the 0 to 0.5 ft bgs depth as directed by the DTSC. To evaluate whether the samples collected with this protocol were representative of the site contamination distribution, and evaluate the connection of the two sets of data, 19 samples were collected from the 0.5 to 1 ft bgs depth interval during the RI. These samples were collected at locations in close proximity to the locations of the historical samples with higher contamination concentrations in December 2003. Of the 19 samples collected from this depth during the RI, the highest PCB-1260 detection was 48 mg/kg. The maximum PCB-1260 concentration detected at the site during the RI sampling in September and December 2003 was 590 mg/kg from the 0 to 0.5 ft bgs depth interval at sample location SS-166.

- The lowest calculated fugitive dust screening concentration, 3,300 mg/kg, would have to be exceeded in surficial samples spread over a 2-acre area of the Site for fugitive dust to contain PCB-1260 that poses unacceptable risk. The highest sample result in a surficial soil

sample (0 to 0.5 ft bgs) collected at the Site from 1998 to 2003 was 590 mg/kg. This result was from one sample location, SS-166-A. Additionally, the highest PCB-1260 soil result at any depth was 3,220 mg/kg in a single soil sample from the 0.5 to 1 ft bgs sampling interval, F03-42. Therefore, based on the calculated screening concentration and the soil sampling analytical results, and the area of PCB-1260 detections, air sampling to further evaluate the inhalation of fugitive dust is not warranted.

The September 2003 soil samples reported to contain the highest concentrations of PCB-1260 were subsequently analyzed for the PCB congeners. The PCB congener results are useful for risk assessment purposes and provide further insight into the PCB composition than PCB-1260 results alone. RI sample results suggest that hexachloro biphenyls and heptachloro biphenyls comprise the highest percentages of the PCB-1260 mixture detected in Site soil samples. The five sets of PCB congener results will be used in the BHERA submittal, which is described in Section 5.6 of the CO. The analytical results for the 209 tested PCB congeners are presented in Appendix A. Congeners are labeled from PCB 1 to PCB 209 according to International Union of Pure and Applied Chemistry (IUPAC) nomenclature [EPA, 2003b].

The RI sample results are compared to the historical results in Appendix A-5. These two sets of data lead to conclusions that include:

- PCB-1260 was not detected at concentrations greater than 0.18 mg/kg below the 4 to 4.5 ft bgs sampling interval.

- PCB-1260 was not detected at concentrations greater than 50 mg/kg below the 1.5 to 2 ft bgs sampling interval.

- Historical and RI data from the range of the sampled depths was used to estimate the area of PCB contamination. The area associated with PCB-1260 detections greater than 0.18 mg/kg is approximately 2.2 acres in extent.

- Historical and RI data from the range of the sampled depths was used to estimate the area of hazardous PCB contamination. The area associated with PCB-1260 detections greater than 50 mg/kg is approximately 0.4 acres in extent.

### 4.3.4 Polynuclear Aromatic Hydrocarbons

PAHs were not detected above Residential PRGs in historical Site soil samples (i.e., prior to the RI) and their historical detections were limited to two discrete locations (R42C1-1 and R47C1-1). However, to evaluate PAH in Site soil as part of the RI, select soil samples were analyzed for PAH by the laboratory. Soil samples were selected for PAH analysis based on:

- The potential for PAH to be co-located with PCB-1260; and

- The potential for PAH co-location with debris piles at the Site.

PAH analytical results are summarized in Table 4-3. Of the 73 samples tested for PAH, twelve soil samples contained detectable levels of PAHs. Nine of the twelve soil samples with detectable PAH analytical results were from the uppermost soil sampling interval, 0-0.5 ft bgs; one PAH detection was from the 2-2.5 ft bgs sampling interval; one PAH detection was from the 4-4.5 ft bgs sampling interval; and, one PAH detection was from the 6-6.5 ft bgs sampling interval. Only five of the twelve reported detections were greater than residential PRG screening concentrations. The concentration of one PAH compound, benzo [a] pyrene in the surficial sample SS-89, was also greater than the industrial PRG concentration. As shown on Figure 4-12, samples having PAH concentrations exceeding PRGs were generally collected from the Area of Concern, indicating that PAH is co-located with elevated PCB-1260 in the area of the single debris pile at the end of the Graham and Bankton roadways. As PCB mixtures were primarily manufactured as a stabilizer for various oil matrices (e.g., transformer insulating oils, hydraulic oils), co-location of these compounds is expected.

### 4.3.5 Dioxins and Furans

To evaluate the potential co-location of dioxins and furans with PCB-1260, the five soil samples with the highest PCB-1260 concentration were subsequently analyzed for dioxins and furans. Each of these samples was collected from the surficial soil (0 to 0.5 ft bgs). Of the five tested samples, one soil sample was reported to contain trace amounts of furan and another to contain trace amounts of dioxin. Total hexachlorodibenzofuran (HxCDF) was detected at 2.5 micrograms (µg)/kg in SS-91-A, which was reported to contain an elevated PCB-1260 concentration. Using international 2,3,7,8- tetrachlorodibenzo-p-dioxin (TCDD) equivalents (ITE factors)[5] to compare the dioxins and furans to reference screening concentrations, 1 µg/kg of Total HxCDF is equivalent to 0 µg/kg of 2,3,7,8-TCDD. Therefore, 2.5 µg/kg of Total HxCDF is equivalent to 0 µg/kg of 2,3,7,8-TCDD, which is below the Residential 2,3,7,8-TCDD PRG of 0.0039 µg/kg. In the surficial sample at SS-134, which was also reported to contain elevated PCB-1260 concentrations, 6.0 µg/kg of 1,2,3,4,5,6,7,8-octachlorodibenzo-*p*-dioxin (OCDD) was detected. Using ITE factors, 1 µg/kg of OCDD is equivalent to 0.001 µg/kg of OCDD of 2,3,7,8-TCDD. Therefore, 6.0 µg/kg of OCDD is equivalent to 0.006 µg/kg 2,3,7,8-TCDD, which is slightly above the 2,3,7,8-TCDD PRG of 0.0039 µg/kg, but below the Industrial PRG of 0.016 µg/kg. The SS-134 sample location is within the Area of Concern identified on Figure 4-12. Based on the fact that only sporadic low level detections of a limited number of dioxin and furan compounds were observed in one out of five samples tested, the presence of dioxins and furans does not appear to be co-located with PCB-1260 in Site soil.

### 4.3.6 Metals

Soil samples were submitted for California Title 22 metal analysis (CCR T22). The list of CCR T22 metals includes: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc. RI metal results are shown in Table 4-4 along with EPA residential and industrial PRGs and the Bolsa Chica background

[5] The 1989 ITE factors are common dioxin and furan evaluation factors that relate the toxicity of given compounds to 2,3,7,8-TCDD, which has available screening concentrations [Cal-EPA, 1996].

concentrations [CH2MHill, 2001] for screening purposes. Sample locations were selected for metal analysis based on:

- The potential for co-location of metals and PCB-1260;
- The potential for co-location of metals and debris piles at the Site; and
- The potential for metals, especially lead and arsenic, to be detected in samples from locations in the vicinity of historical sample points of interest [DTSC, 2003].

As shown in Table 4-4, the metal results can be summarized as follows:

- No metals were detected above noncancer residential PRG screening concentrations;
- Arsenic was detected above its cancer endpoint residential PRG screening concentration in the samples that contained detectable concentrations of arsenic;
- Metal results were consistent with the Bolsa Chica background concentrations;
- No metal co-location trends were identified at the PCB-impacted areas, debris locations, or historic sample points; and
- Arsenic and lead concentrations were not above residential noncancer PRG screening values in samples from the 12 locations tested based on elevated historical arsenic and lead results (SS-64C4-A,B,C,D, SS-67C2-A,B,C,D, and SS-80C4-A,B,C,D).

## 4.4 Ground Water

Unfiltered groundwater samples were collected from five locations. The groundwater sampling locations included:

- MW-2 and P-9, permanent groundwater monitoring locations screened in the semi-perched aquifer underlying the Site; and

- Three temporary groundwater probes advanced into the semi-perched aquifer underlying areas where Site soil was reported to contain elevated PCB-1260 concentrations.

Groundwater samples were analyzed for PCB-1260 and PAH in accordance with the RI Workplan (GeoSyntec, 2003). The analytical laboratory reports are included in Appendix A-2. As shown in the laboratory reports, groundwater samples did not contain detectable concentrations of PCB-1260 or PAH.

Groundwater analytical results suggest that PCB-1260 and PAH are confined to Site soil and have not migrated to groundwater underlying the Site.

## 4.5 Surface Water

Unfiltered surface samples were collected from two locations. The groundwater sampling locations included:

- Planned location SW-137 from a drainage feature in the northern portion of the Site; and

- Location SW-138 from another location in the northern portion of the Site near the Wintersburg Channel. SW-138 was sampled because stormwater was accumulating in that area. Locations near the Area of Concern were not accumulating stormwater.

Surface water samples were analyzed for PCB-1260 in accordance with the RI Workplan (GeoSyntec, 2003). The analytical laboratory reports are included in Appendix A-2. As shown in the laboratory reports, surface water samples did not contain detectable concentrations of PCB-1260.

# 5. CONTAMINANT FATE AND TRANSPORT

## 5.1 General

As described in Section 4 of this RI Report, soil was the only sampled media reported to contain detectable concentrations of target analytes. The chemical detections in Site soils evaluated in Section 4.3 can be grouped into two general categories:

- Persistent organic compounds including PCB-1260, PAH, and dioxins and furans [EPA, 2003a]; and
- Metals.

The organic compounds detected in Site soil samples above their respective screening values are characterized by physical and chemical properties that make them non-volatile, persistent, and stable (i.e., minor to negligible degradation and/or attenuation effects over time) [EPA, 2003]. Although this section focuses on PCB-1260 since it is the most widespread chemical detected above PRG, the other chemicals detected above PRGs (benzo[a]pyrene, dibenzo[a,h]anthracene, and OCDD) exhibit similar properties to PCB-1260. They are relatively stable, have very low water solubilities and vapor pressures, tend to adsorb to organic carbon, and have low environmental degradation rates. This section includes a preliminary discussion of the fate and transport of these chemicals to confirm that the Site does not pose a threat to human health or the environment in its current configuration. A more detailed discussion of potential exposure pathways, transport mechanisms, and receptors will be presented in the BHERA, as needed.

The group of target analytes referred to as “metals” include chemicals detected using EPA Methods 6010B/7000. As discussed in Section 4, metal concentrations within the Site are consistent with background concentrations. Since the detected metal concentrations are consistent with background concentrations and were not detected above noncancer residential PRGs, metals will not be discussed further.

## 5.2 Contaminant Distribution and Persistence

As outlined in Section 4, PCB-1260 is the main chemical of concern detected in Site soil. Other chemicals that were detected in RI samples were either below PRGs or co-located with elevated PCB-1260 Site soil concentrations. Thus, the focused Area of Concern for the target analytes is approximately one to two acres in extent and located adjacent to the northeastern property boundary (see Figure 4-11).

Using the identified focus area as a basis, the persistence of PCB-1260 was qualitatively evaluated to estimate the potential for PCB-1260 to disperse via mechanisms including volatilization, degradation, or chemical reaction. Properties of PCB-1260 are summarized in Table 5-1, including: solubility, vapor pressure, boiling point, flash point, molecular weight, and evaporation rate. PCB-1260 and the other co-located persistent organic compounds are very stable in their current physical state. Even under extreme weather conditions at the Site (i.e., extreme heat or cold, and/or rain, etc.), PCB-1260 is relatively stable. The likelihood of PCB-1260 volatilizing, degrading, or reacting at the Site is low. In the absence of physical dispersion of the soil matrix reported to contain PCB-1260, the existing RI soil data would likely be representative of the Site for several years. Physical dispersion by natural means (e.g., via wind, water runoff) and by mechanical means (e.g., via animal species or human transgression of the Site) are the predominant dispersion mechanisms.

## 5.3 Potential Routes of Migration

### 5.3.1 Introduction

This section presents an evaluation of potential migration pathways for PCB-1260 from the areas where it was detected. This evaluation builds upon the hydrogeologic characterization of the Site and facts relating to the nature and properties of PCB-1260 previously discussed and presented in Table 5-1. The following evaluation will be expanded, as needed, in the BHERA, including a detailed exposure pathway analysis and target receptor evaluation.

### 5.3.2 Transport Mechanisms

PCB-1260 distribution is described in Section 4 and the associated figures and tables. As described in Section 5.2, PCB-1260 is a relatively stable compound; volatilization, biodegradation, and other reactions are negligible compared to physical dispersion. The major forces capable of transporting PCB-1260 are physical transport, including soil tracking via human and ecological populations crossing the site, precipitation, and wind [GeoSyntec, 2003].

Physical transport can occur via various organisms tracking PCB-1260 contaminated soil on their person, clothing, or equipment. Currently, the main area of contamination is fenced to control human trespass. Physical transport may also occur via precipitation on the Site that could potentially cause the movement of PCB-contaminated soil particles. Turbid water will either be shed as runoff or will infiltrate into Site soils. To impede surface water flow across the property boundary, stormwater control measures have been implemented in areas hydraulically downgradient from the northeastern property boundary of the Site. Water that infiltrates into soils will then either ultimately be lost through evaporation at the ground surface or will migrate downward as recharge to groundwater. Considering the tendency for PCBs to adsorb to silts and clays (especially those with a high organic fraction, such as in seasonal pond environments) in the upper soil profile at the Site, and the low water solubilities of PCBs, the potential for downward migration of PCB-1260 due to water infiltration is slight. This statement is supported by previous investigations and the RI that found the PCB-1260 to be retained in the upper few feet of the soil profile, even after years of precipitation infiltration. PCB-1260 physical properties, along with the interpretation of the properties as they pertain to PCB-1260 fate and transport, are presented in Table 5-1

Another possible transport mechanism for PCB-1260 is via wind blown soil particles. As discussed previously, normal winds experienced at the Site consist of moderate on-shore breezes from the southwest and occasionally stronger Santa Ana winds from the northeast (see Table 2-1) [GeoSyntec, 2003]. Therefore, it would be expected that soil particles with adsorbed fractions of PCB-1260 would be transported in these general directions under appropriate wind conditions. As with surface water transport, the quantity and distance the material may be transported will be a function of the wind velocity and fetch in a particular direction. Considering the nature of the PCB-1260 (i.e., present generally as an oily matrix), higher densities, adhesion to

organic fraction of soil, as well as the presence of vegetation at the Site, transport of significant concentrations of PCB-1260 via wind-blown dust is unlikely. Section 4.3 of this RI Report further illustrates the insignificance of the fugitive dust pathway for this Site. However, this exposure pathway will be considered in the BHERA.

### 5.3.3 Risk Assessment and Site Mitigation Processes

Following completion of the RI phase of the project, and depending on the DTSC evaluation of the RI data, additional steps will be performed at the Site. These steps could include risk assessment followed by mitigation of evaluated risks, or mitigation of the Site based on the screening values used in this RI. These screening values are risk-derived concentrations, and therefore could be used to expedite the process of achieving Site mitigation by abbreviating the risk assessment phase of the work.

If a detailed risk assessment is warranted, the fate and transport of the Site constituent of concern, PCB-1260, will be used to prepare the BHERA, as needed. The fate and transport pathways will be used to identify potential receptors at the Site and their associated exposure scenarios.

# 6. SUMMARY AND CONCLUSIONS

## 6.1 Nature and Extent of Contamination

Section 4 of this RI Report describes the nature and extent of contamination at the Site for the following media:

- Soil;
- Groundwater; and
- Surface Water.

Based on information gathered during the RI, the following conclusions are made:

- Although the current Area of Concern is located near where Graham Street, Bankton Drive, and Beck Circle intersect the Site, coincident with the primary debris pile area, the original source of this contamination was not identified.;

- Soil, groundwater, and surface water samples were collected and analyzed by the laboratory as part of the RI, and target analytes were only detected in Site soil samples, not in groundwater or surface water;

- The target analyte concentrations above screening values are limited to the upper 4.5 ft of soil in an Area of Concern approximately one acre in extent;

- The RI results for PCB-1260 exceeding 50 mg/kg were from the upper 0.5 feet of an approximately 0.2-acre portion within the one-acre area;

- The one acre area of the Site where the RI target analytes are concentrated is along the northeastern Site boundary near the ends of Graham Street and Bankton Drive, no PCB-1260 was evident in the remaining 98% of the property;

- PCB-1260 is the primary Site contaminant;

- Low levels of PAH and OCDD were detected above screening concentrations in a limited number of Site soil samples generally within the approximately one acre Area of Concern;

- Metals reported by the analytical laboratory, especially arsenic and lead, are consistent with Bolsa Chica background concentrations; and

- In groundwater samples, PAH and PCB-1260 were below analytical laboratory detection limits; therefore, groundwater is not a media of concern at the Site.

Appendix A-5 shows the historical and RI data from the various sampling intervals. Since the sampling depths differed between the historical sampling and the RI (e.g., 205 RI samples were collected from the 0 to 0.5 ft bgs interval as directed by the DTSC, which was not historically sampled by Hearthside), it is difficult to compare the two data sets. However, based on the historical and RI soil results presented in Appendix A-5, and specifically the December 2003 data which provide a link between the two data sets, the following observations can be made:

- The PCB-1260 contaminated area is located near the northeastern property boundary where Graham Street, Bankton Drive, and Beck Circle intersect the Site.

- PCB-1260 was not detected at concentrations greater than 0.18 mg/kg below the 4 to 4.5 ft bgs sampling interval.

- PCB-1260 was not detected at concentrations greater than 50 mg/kg below the 1.5 to 2 ft bgs sampling interval.

- The area associated with PCB-1260 detections greater than 0.18 mg/kg is approximately 2.2 acres in extent.

- The area associated with PCB-1260 detections greater than 50 mg/kg is approximately 0.4 acres in extent.

## 6.2 Fate and Transport

PCB-1260, the primary Site contaminant, is a persistent, organic, man-made compound that is resistant to biodegradation. PCB-1260 fate and transport is described in Section 5 and summarized in Table 5-1. Pertinent conclusions regarding PCB-1260 fate and transport include:

- PCB-1260 is a stable compound that is resistant to degradation, is a sticky resin at standard temperature and pressure, evaporation is negligible at standard temperature and pressure, chemical migration through the soil matrix is impeded by its strong absorption to soil particles and low water solubility;

- Chemical transport mechanisms are primarily via physical dispersion as it absorbs strongly to soil and can be transported as it adheres to the soil matrix via tracking, stormwater flow, and wind;

- PCB-1260 transport to groundwater, based on PCB-1260 physical properties and groundwater sample results, is not occurring at the Site;

- Based on the Cowherd model [EPA, 1996a], calculated fugitive dust emissions are below acceptable risk levels; and

- Currently, potential exposure to the target analytes is controlled, the area is fenced where PCB-1260 soil results exceeded screening concentrations.

## 6.3 Future Work

The RI was conducted in general accordance with the approved RI Workplan [GeoSyntec, 2003]. Deviations from the RI Workplan are outlined in Table 3-2. Remaining work to be performed at the Site includes the performance of a Site risk assessment and/or site mitigation.

The RI data set forms the basis for future Site work including the BHERA and the Feasibility Study (FS) for Site mitigation. At this stage of the project, prior to discussion of this RI Report with the DTSC, remedial action objective (RAO) development is premature. Final RAOs will be based on the results of the BHERA and will be used to evaluate the contaminant concentrations in Site soil that pose risk to human health and the environment Generally, preliminary RAOs for the affected Site media are developed once a conceptual understanding of the Site is formed. [EPA, 1988] The preliminary RAOs presented here assume that PCB-1260 is the primary contaminant of concern and that it has affected only Site soil. Although the RAOs may be revised in the future and will later be applied to the Site remedy, preliminary RAOs for the Site are to:

- Continue to reduce the potential for human exposure to Site soil via institutional controls;
- Continue to implement engineering controls, such as the sand bags placed to limit stormwater migration from the Site, where necessary;
- Mitigate chemical concentrations in Site soil, as warranted; and
- Provide for a long-term plan for maintaining the Site and mitigating potential chemical exposures below appropriate risk levels.

These preliminary RAOs will be discussed with the DTSC prior to proceeding with the next steps of the project.

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# TABLES

# REMEDIAL INVESTIGATION REPORT
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

**TABLE 1-1**
**CONSENT ORDER COMPLIANCE CHECKLIST**
**DOCKET No. HSA-CO 01/02-154**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**
**(Updated 18 June 2004)**

| DELIVERABLE NO. | ITEM | C.O. SECTION | COMPLIANCE DATE | SUBMITTAL DATE |
|---|---|---|---|---|
| 1a | Identification of Project Coordinator | 6.1 | 11 July 02 | 8 July 02 |
| 1b | Identification of Project Engineer | 6.2 | 16 July 02 | 11 July 02 |
| 2 | Remedial Investigation Workplan | 5.2.2 | 31 July 02<br>* Revised for submittal on 20 Feb 2003<br>** Second revision 23 May 2003<br>***Third Revision 21 July 2003 | 31 July 02<br>*20 Feb 2003<br>**23 May 2003<br>***21 July 2003 |
| 2a | Project Management Plan | 5.2.2 (a) | 31 July 02 | 31 July 02<br>*20 Feb 03<br>** 23 May 2003 |
| 2b | Health and Safety Plan | 5.2.2 (e) | 31 July 02 | 31 July 02<br>*20 Feb 03<br>** 23 May 2003 |
| 2c | Quality Assurance Project Plan | 5.2.2 (d) | 31 July 02 | 31 July 02<br>*20 Feb 03<br>** 23 May 2003 |
| 3 | Public Participation Plan | 5.8 | --- | 10 Feb 03 |
| 4 | Remedial Investigation Report | 5.5 | TBD<br>* Revised for submittal on 15 June 2004 | 9 Feb 04<br>*18 June 04 |
| 5 | Interim Screening and Evaluation Document | 5.3 | TBD | |
| 6 | Baseline Health and Ecological Risk Workplan | | TBD | |
| 7 | Baseline Health and Ecological Risk Assessment | 5.6 | TBD | |
| 8 | Feasibility Study Workplan | 5.2.2 | TBD | |

**Notes**: TBD = To Be Determined based on project progress.

**TABLE 1-1 (continued)**
**CONSENT ORDER COMPLIANCE CHECKLIST**
**DOCKET No. HSA-CO 01/02-154**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**
**(Updated 18 June 2004)**

| DELIVERABLE NO. | ITEM | C.O. SECTION | COMPLIANCE DATE | SUBMITTAL DATE |
|---|---|---|---|---|
| 9 | Feasibility Study Report | 5.7 | TBD | |
| 10 | Initial Study and Checklist | 5.9 | TBD | |
| 11 | RAP | 5.10 | TBD | |
| 11a | Responsiveness Summary | 5.10 | TBD | |
| 12 | Remedial Design | 5.11 | TBD | |
| 13 | Implementation Report | 5.13 | TBD | |
| 14 | O&M Workplan | 5.15 | TBD | |
| **PERIODIC SUBMITTALS** | | | | |
| MS-1 | Monthly Summary Report | 6.3 | 31 July 02 | 31 July 02 |
| MS-2 | Monthly Summary Report | 6.3 | 15 Sep 02 | 10 Sep 02 |
| MS-3 | Monthly Summary Report | 6.3 | 15 Oct 02 | 15 Oct 02 |
| MS-4 | Monthly Summary Report | 6.3 | 15 Nov 02 | 15 Nov 02 |
| MS-5 | Monthly Summary Report | 6.3 | 15 Dec 02 | 12 Dec 02 |
| MS-6 | Monthly Summary Report | 6.3 | 15 Jan 03 | 13 Jan 03 |
| MS-7 | Monthly Summary Report | 6.3 | 15 Feb 03 | 11 Feb 03 |
| MS-8 | Monthly Summary Report | 6.3 | 15 Mar 03 | 6 Mar 03 |
| MS-9 | Monthly Summary Report | 6.3 | 15 April 03 | 1 April 03 |
| MS-10 | Monthly Summary Report | 6.3 | 15 May 03 | 13 May 03 |
| MS-11 | Monthly Summary Report | 6.3 | 15 June 03 | 10 June 03 |
| MS-12 | Monthly Summary Report | 6.3 | 15 July 03 | 7 July 03 |
| MS-13 | Monthly Summary Report | 6.3 | 15 Aug 03 | 8 Aug 03 |
| MS-14 | Monthly Summary Report | 6.3 | 15 Sep 03 | 15 Sep 03 |
| MS-15 | Monthly Summary Report | 6.3 | 15 Oct 03 | 13 Oct 03 |
| MS-16 | Monthly Summary Report | 6.3 | 15 Nov 03 | 14 Nov 03 |
| MS-17 | Monthly Summary Report | 6.3 | 15 Dec 03 | 15 Dec 03 |
| MS-18 | Monthly Summary Report | 6.3 | 15 Jan 04 | 8 Jan 04 |
| MS-19 | Monthly Summary Report | 6.3 | 15 Feb 04 | 10 Feb 04 |
| MS-20 | Monthly Summary Report | 6.3 | 15 Mar 04 | 8 Mar 04 |
| MS-21 | Monthly Summary Report | 6.3 | 15 April 04 | 8 April 04 |
| MS-22 | Monthly Summary Report | 6.3 | 15 May 04 | 14 May 04 |
| MS-23 | Monthly Summary Report | 6.3 | 15 June 04 | 14 June 04 |

**Notes**: TBD = To Be Determined based on project progress.

**TABLE 1-2**
**REMEDIAL INVESTIGATION REPORT CONTENTS**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**

| Consent Order Section | Content | Remedial Investigation Report Section |
|---|---|---|
| 5.5(a) | Site Physical Characteristics | Section 2 |
| 5.5(b) | Sources of Contamination | Section 4.2, 4.3 |
| 5.5(c) | Nature and Extent of Contamination | Section 4 |
| 5.5 | Fate and Transport Evaluation | Section 5 |

**TABLE 2-1**
**SITE METEOROLOGICAL SUMMARY**
**REMEDIAL INVESTIGATION REPORT**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**

| MONTH | MONTHLY AVERAGE TEMPERATURE (degrees F) | MONTHLY AVERAGE PRECIPITATION (in.) | WIND SPEED (MPH) |
|---|---|---|---|
| January | 57.1 | 2.60 | 5.2 |
| February | 58.1 | 2.54 | 6.0 |
| March | 59.2 | 2.25 | 6.7 |
| April | 61.9 | 0.70 | 7.4 |
| May | 64.5 | 0.18 | 7.1 |
| June | 67.9 | 0.08 | 7.0 |
| July | 71.4 | 0.02 | 6.8 |
| August | 72.8 | 0.09 | 6.6 |
| September | 71.7 | 0.30 | 6.2 |
| October | 67.7 | 0.28 | 5.6 |
| November | 61.5 | 1.02 | 5.2 |
| December | 57.1 | 1.59 | 5.0 |

NOTES:
Based on data from over 4,000 Huntington Beach weather stations.
Data complied on www.city-data.com/city/Huntington-Beach-California.html.

# TABLE 2-2
# SITE OWNERSHIP CHRONOLOGY
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

| DATE | OWNERSHIP |
|---|---|
| Pre-1970 | Signal Oil and Gas Company ("SOAG") acquired various individual fractionalized fee interests in the Bolsa Chica property from a number of co-tenants, totaling approximately 2,000 acres. The Bolsa Chica property included a 42-acre area now known as the Fieldstone property. |
| January 1970 | The Signal Companies, Inc. conveyed its oil and gas business to its subsidiary, SOAG and then acquired approximately 2,000 acres at Bolsa Chica (which included the Fieldstone property) from SOAG, subject to outstanding oil and gas leases. |
| February 1970 | The Signal Companies, Inc. conveyed the Fieldstone property to its subsidiary, Signal Properties, Inc. |
| July 1970 | Signal Properties, Inc. conveyed the Fieldstone property to its subsidiary, Signal Bolsa Corporation. |
| 1974 | Signal Bolsa corporation conveyed approximately 220 acres, including the Fieldstone property, to A-S Development, Inc.[1] for residential development |
| August 1974 | A-S Development, Inc. conveyed the Fieldstone property to Kendall Development Co., Inc.[1] Kendall merged with W.R. Grace Properties, Inc.[1] in 1976. (W.R. Grace Properties has subsequently filed for bankruptcy.) |
| July 1989 | The Fieldstone Company acquired the 42-acre property from W.R. Grace Properties, Inc. |
| September 1997 | Signal Bolsa Corporation acquired the 42-acre property from the Fieldstone Company. |
| January 1998 | Signal Bolsa Corporation was merged into its parent, Signal Landmark |
| December 1999 | Signal Landmark transferred title of the Fieldstone property to its subsidiary. Hearthside Residential Corp. |

1 These entities are unrelated third parties.

**TABLE 2-3**
**CHRONOLOGICAL SITE INVESTIGATIONS SUMMARY**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**

| DATE | INVESTIGATING PARTY | SAMPLING DESIGN | MEDIA SAMPLED | ANALYTICAL SUITE(S) | ORGANIC CHEMICAL DETECTIONS GREATER THAN RES. PRGs[(1)] | SAMPLER/ DATA SOURCE |
|---|---|---|---|---|---|---|
| October 1998 | California State Lands Commission | Random Composite | Soil | Gen Min<br>Hydrocarbons<br>Metals<br>O&G<br>PCB/Pest<br>SVOCs<br>VOCs | PCB Aroclor 1260<br>Total PCB | CH2MHill<br>[CH2MHill, 2001] and Appendix A-3 |
| April 1999 | Hearthside | Discrete<br>(Re-sample points used in October 1998 Composite) | Soil | PCBs | PCB Aroclor 1260 | PIC<br>[GeoSyntec, 2003] |
| August 1999 | Hearthside | Discrete<br>(Delineation of areas where PCB was detected in April 1999) | Soil | TRPH<br>PCB | PCB Aroclor 1260 | GeoSyntec Consultants<br>[GeoSyntec, 2003] and Appendix A-4 |
| October 1999 | Hearthside | Discrete<br>(Expansion of areas where PCB was detected in August 1999) | Soil | PCB | PCB Aroclor 1260 | GeoSyntec Consultants<br>[GeoSyntec, 2003] and Appendix A-4 |
| April 2000 | California State Lands Commission | Bolsa Chica Ecological Risk Assessment | Soil | Gen Min<br>Hydrocarbons<br>Metals<br>O&G<br>PCB/Pest<br>SVOCs<br>VOCs | None | CH2MHill<br>[CH2MHill, 2001] and Appendix A-3 |
| April 2001 | Hearthside | Discrete<br>(Further delineation of areas with PCB detections) | Soil | PCB | PCB Aroclor 1260 | GeoSyntec Consultants<br>[GeoSyntec, 2003] and Appendix A-4 |
| November 2001 | Hearthside | Discrete<br>(Further delineation of areas with PCB detections and evaluation of SVOC co-location)) | Soil | PCB<br>SVOCs | PCB Aroclor 1260 | GeoSyntec Consultants<br>[GeoSyntec, 2003] and Appendix A-4 |

**TABLE 2-3 (continued)**
**CHRONOLOGICAL SITE INVESTIGATIONS SUMMARY**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**

| DATE | INVESTIGATING PARTY | SAMPLING DESIGN | MEDIA SAMPLED | ANALYTICAL SUITE(S) | ORGANIC CHEMICAL DETECTIONS GREATER THAN RES. PRGs[(1)] | DATE |
|---|---|---|---|---|---|---|
| September 2003<br>December 2003 | Hearthside | Composite<br>(Evaluate uncharacterized areas)<br>Discrete<br>(Further delineation of areas with PCB detections and evaluation of co-located debris piles) | Soil | PCB<br>PAH<br>Title 22 Metals<br>Dioxins/Furans | PCB Aroclor 1260<br>Benzo[a]pyrene<br>Dibenzo[a,h]anthracene<br>OCDD | GeoSyntec Consultants [GeoSyntec, 2003] and Appendix A-1 |
| October 2003 | Hearthside | Grab Sample<br>(Evaluate detectable levels of PCB and PAH in site groundwater) | Groundwater | PCB<br>PAH | None | GeoSyntec Consultants [GeoSyntec, 2003] and Appendix A-1 |
| TBD[(2)] | Hearthside | Grab Sample<br>(Evaluate potential for PCB transport via storm water flow) | Surface Water | PCB | TBD | TBD |

**NOTES:**
(1) Refers to the samples collected on the Fieldstone property
(2) Proposed surface water samples contingent on first rains.

Aroclor – Designated Mixture of PCB
Gen Min – General Minerals
O&G – Oil and Gas
PAH – Polycyclic aromatic hydrocarbons
PCB/Pest – Polychlorinated Biphenyls/Pesticides
RES. PRG – USEPA Region 9 Preliminary Remediation Goals for Residential Areas
SVOCs – Semi-Volatile Organic Chemical
TBD – To Be Determined
OCDD – 1,2,3,4,5,6,7,8-octachlrodibenzo-*p*-dioxin

**TABLE 3-1**
**SAMPLING AND ANALYSIS SUMMARY**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**

| SAMPLE TYPE | SAMPLE DESCRIPTION | SAMPLE DESIGNATION[1] | NUMBER OF SAMPLES COLLECTED/TESTED | ANALYSES | DEPENDENT ANALYSES |
|---|---|---|---|---|---|
| Uncharacterized (Composite) Locations | **130 Sample Locations** 5-to-1 composites at 0, 2, 4, 6 ft bgs | SS-63 to SS-88 | 520/104 | **EPA 8082** (PCB) **EPA 6010B/7000**[2] (Title 22 Metals for two historical sampling locations) | **EPA 1668A** (PCB Congerer) **EPA 8280A** (Dioxins/Furans) PCB Congener (high resolution) and Dioxin/Furans analyses were performed on 5 of the highest PCB detections (SS-90-A, SS-91-A, SS-91-B, SS-93-A, SS-134-A, and) in site soil samples. |
| Uncharacterized (Discrete) Locations | **7 Locations** Discrete at 0, 2, 4, 6 ft bgs | SS-126 to SS-132 | 28/28 | **EPA 8082** (PCB) | |
| Follow-Up Uncharacterized (Discrete) Locations[3] | **12 Locations** Discrete at 0, 0.5, 2 ft bgs | SS-150 to SS-151 SS-156 to SS-160 SS-167 to SS-171 | 36/36 | **EPA 8082** (PCB) | |
| Debris Locations | **13 Locations** Discrete at 0, 2, 4, 6 ft bgs | SS-98 to SS-107 SS-134 to SS-136[4] | 52/52 | **EPA 8082** (PCB) **EPA 6010B/7000** (Title 22 metals) **EPA 8310** (PAH) | |
| Surface Water Drainage Areas | **25 Locations** Discrete at Surface (0 ft bgs) | SS-113 to SS-125[5] SS-142 to SS-149[3] SS-152 to SS-155[3] | 25/25 | **EPA 8082** (PCB) | |
| Confirmation Sample in Previous PCB Area (Upper 2.5 ft) | **9 Locations** Discrete at 0, 2 ft bgs | SS-89 to SS-97 | 18/18 | **EPA 8082** (PCB) **EPA 6010B/7000** (Title 22 Metals) **EPA 8310** (PAH) | |
| Confirmation Sample in Previous PCB Area (2.5 to 6.5 ft bgs) | **9 Locations** Discrete at 4, 6 ft bgs | SS-89 to SS-97 | 18/18 | **EPA 8082** (PCB) | |
| Depth Profile Testing in Previous PCB Area[3] | **7 Locations** Discrete at 0, 0.5, 1, 1.5, 2 ft bgs | SS-161 to SS-166 SS-172 | 35/35 | **EPA 8082** (PCB) | No dependent analyses |
| Site Asphalt Pile Sample | **1 location** Grab sample of asphalt material. | SS-173 | 1/1 | **EPA 8082** (PCB) | No dependent analyses |
| Groundwater | **5 Locations** Grab sample | GW-108 to GW-112 | 5/5 | **EPA 8082** (PCB) **EPA 8310** (PAH) | No dependent analyses |
| Surface Water | **2 Locations** Grab sample | SW-137 to SW-138 | 2/2 | **EPA 8082** (PCB) | No dependent analyses |
| | | **TOTALS** | 740/324 | | |

**NOTES:**

(1) Sample Designation: [Media]-[Location number]-[C+Composite number within group (if applicable)]-[Depth (A,B,C, or D)]-[D(uplicate)][(S(plit)]
(2) SS-80-C4, SS-64-C4, SS-67-C2 were analyzed for title 22 metals for location-specific arsenic and lead evaluation.
(3) Locations sampled in December 2003 based on September 2003 results.
(4) Additional soil samples were collected based on field observations.
(5) SS-115-A, SS-116-A, SS-116-A(D), and SS-124-A were analyzed by the laboratory for PAH (EPA 8310).

**TABLE 3-2**
**DEVIATIONS FROM THE RI WORKPLAN**
**REMEDIAL INVESTIGATION REPORT**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**

| RI WORKPLAN PROVISION [GeoSyntec, 2003] | RI IMPLEMENTATION | REASON FOR DEVIATION |
|---|---|---|
| Composites only, with no discrete locations were to be sampled in uncharacterized area. | 7 discrete locations sampled and analyzed for PCB-1260 | 7 discrete locations were added in the field to improve sampling coverage in the uncharacterized area. |
| 10 debris locations to be sampled. | 13 debris locations were sampled. | 3 debris locations were added in the field based on extra debris pile locations and DTSC field personnel input. |
| Hand auger/hand shovel to be used to sample uppermost soil interval (0 – 0.5 ft bgs). | Direct push sampling sleeves filled directly. | Acceptable sample recovery was experienced by the direct push methods used at the Site. To be consistent with other RI soil samples, direct push methodologies were retained for 0-0.5 ft bgs samples. |
| No additional soil sampling upon completion of RI Workplan. | Sample locations added for December 2003 sampling based on September 2003 results. | Data needs were identified following evaluation of September 2003 soil data. |

**TABLE 4-1**
**SOIL SCREENING FOR FUGITIVE DUST**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**

| EQUATION NO. | DEFINITION | PARAMETER | EQUATION |
|---|---|---|---|
| **1** | **Soil Screening Level Equation for Inhalation of Carcinogenic Dust from Residential Soil [EPA, 1996]** | Screening Level (mg/kg) | $= \frac{TR \cdot AT \cdot 365d/yr}{URF \cdot 1{,}000\mu g/mg \cdot EF \cdot ED \cdot \frac{1}{PEF}}$ |
| **2** | **Inhalation Unit Risk Factor (URF) for PCB-1260** | URF $(mg/m^3)^{-1}$ | $= SF_O \cdot \frac{Exposure}{bodyweight}$ |
| **3** | **Particulate Emission Factor** | PEF ($m^3/kg$) | $= Q/C \times \frac{3{,}600s/hr}{0.036 \cdot (1-V) \cdot (U_M{}^3/U_t^3) \cdot F(x)}$ |

**DEFINITIONS**

| Parameter | Definition | Units | Chemical-Specific and Default Values [EPA, 1996] | Source |
|---|---|---|---|---|
| TR | Target cancer risk | unitless | $10^{-6}$ | [EPA, 1996a] |
| AT | Averaging time | yr | 70 | [EPA, 1996a] |
| EF | Exposure frequency | d/yr | 350 | [EPA, 1996a] |
| ED | Exposure duration | yr | 30 | [EPA, 1996a] |
| PEF | Particulate emission factor | $m^3/kg$ | $1.32x10^9$ | [EPA, 1996a] |
| $SF_O$ | Chemical specific cancer slope factor for oral inhalation | kg·day/mg | 2 | [EPA, 2002c] |
| Exposure | Inhalation rate | $m^3/day$ | 20 | [EPA, 1996a] |
| Bodyweight | Average human bodyweight | kg | 70 | [EPA, 1996a] |
| URF | Inhalation unit risk factor | $(\mu g/m^3)^{-1}$ | 0.57 | Calculated using equation 2 |
| Q/C | Inverse of mean concentration at center of a 0.5, 1, and 2-acre source in site's geographic region | $\frac{g/m^2 \cdot s}{kg/m^3}$ | 68.81, 60.24, 53.30 | Q/C varies inverseley to source area size [EPA, 1996b] |
| V | Fraction of vegetative cover | unitless | 0.5 | [EPA, 1996a] |
| $U_m$ | Mean annual windspead | m/s | 4.69 | [EPA, 1996a] |
| $U_t$ | Equivalent threshold value of windspeed at 7 meters | m/s | 11.32 | [EPA, 1996a] |
| F(x) | Cowherd function dependent factor | unitless | 0.194 | [EPA, 1996a] |

**CALCULATIONS AND RESULTS**

| Parameter | Scenario 1 - default values | Scenario 2 - 0.5-acre source in L.A. Region | Scenario 3 - 1-acre source in L.A. Region | Scenario 4 - 2-acre source in L.A. Region |
|---|---|---|---|---|
| TR | $10^{-6}$ (default) | $11^{-6}$ (default) | $12^{-6}$ (default) | $13^{-6}$ (default) |
| AT | 70 (default) | 70 (default) | 70 (default) | 70 (default) |
| EF | 350 (default) | 350 (default) | 350 (default) | 350 (default) |
| PEF | $1.32x10^9$ (default) | $9.98x10^8$ (equation 3) | $8.73x10^8$ (equation 3) | $7.73x10^8$ (equation 3) |
| PCB-Specific $SF_O$ | 2 ([EPA, 2002c]) | 3 ([EPA, 2002c]) | 4 ([EPA, 2002c]) | 5 ([EPA, 2002c]) |
| Exposure | 20 (default) | 20 (default) | 20 (default) | 20 (default) |
| Bodyweight | 70 (default) | 70 (default) | 70 (default) | 70 (default) |
| URF | 0.57 (equation 2) | 0.57 (equation 2) | 0.57 (equation 2) | 0.57 (equation 2) |
| Q/C | 90.80 (default) | 68.81 (0.5-acre source) | 60.24 (1-acre source) | 53.30 (2-acre source) |
| V | 0.5 (default) | 0.5 (default) | 0.5 (default) | 0.5 (default) |
| $U_m$ | 4.69 (default) | 4.69 (default) | 4.69 (default) | 4.69 (default) |
| $U_t$ | 11.32 (default) | 11.32 (default) | 11.32 (default) | 11.32 (default) |
| F(x) | 0.194 (default) | 0.194 (default) | 0.194 (default) | 0.194 (default) |
| ***SSL (mg/kg)*** | ***5,600*** | ***4,300*** | ***3,700*** | ***3,300*** |

# TABLE 4-2
# SOIL CHEMICAL DETECTION SUMMARY
# POLYCHLORINATED BIPHENYL (PCB)
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

| Sample Name | Discrete/ Composite | Sample Depth | Sample Date | PCB-1260 (mg/kg) |
|---|---|---|---|---|
| SS-97-A (D) | Discrete | 0 - 0.5 | 09/17/03 | **0.01** |
| SS-102-C | Discrete | 4 - 4.5 | 09/16/03 | **0.011** |
| SS-104-A | Discrete | 0 - 0.5 | 09/16/03 | **0.018** |
| SS-104-C | Discrete | 4 - 4.5 | 09/16/03 | **0.011** |
| SS-117-A | Discrete | 0 - 0.5 | 09/17/03 | **0.014** |
| SS-120-A | Discrete | 0 - 0.5 | 09/17/03 | **13** |
| SS-121-A | Discrete | 0 - 0.5 | 09/16/03 | **0.01** |
| SS-123-A | Discrete | 0 - 0.5 | 09/10/03 | **0.023** |
| SS-125-A | Discrete | 0 - 0.5 | 09/11/03 | **0.059** |
| SS-127-C | Discrete | 4 - 4.5 | 09/08/03 | **0.073** |
| SS-130-A | Discrete | 0 - 0.5 | 09/16/03 | **0.01** |
| SS-134-A | Discrete | 0 - 0.5 | 09/17/03 | **17** |
| SS-134-B | Discrete | 2 - 2.5 | 09/17/03 | **0.055** |
| SS-134-C | Discrete | 4 - 4.5 | 09/17/03 | **1.4** |
| SS-142-A | Discrete | 0 - 0.5 | 12/23/03 | **0.019** |
| SS-144-A | Discrete | 0 - 0.5 | 12/23/03 | **0.076** |
| SS-145-A | Discrete | 0 - 0.5 | 12/23/03 | **0.01** |
| SS-146-A | Discrete | 0 - 0.5 | 12/23/03 | **0.012** |
| SS-148-A | Discrete | 0 - 0.5 | 12/23/03 | **0.011** |
| SS-148-A(D) | Discrete | 0 - 0.5 | 12/23/03 | **0.025** |
| SS-149-A | Discrete | 0 - 0.5 | 12/23/03 | **0.011** |
| SS-150-A | Discrete | 0 - 0.5 | 12/23/03 | **0.03** |
| SS-150-B | Discrete | 0.5 - 1.0 | 12/23/03 | **0.027** |
| SS-151-A | Discrete | 0 - 0.5 | 12/23/03 | **4.8** |
| SS-151-A(S) | Discrete | 0 - 0.5 | 12/23/03 | **10** |
| SS-151-B | Discrete | 0.5 - 1.0 | 12/23/03 | **0.046** |
| SS-151-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.013** |
| SS-152-A | Discrete | 0 - 0.5 | 12/23/03 | **25** |
| SS-153-A | Discrete | 0 - 0.5 | 12/23/03 | **0.059** |
| SS-154-A | Discrete | 0 - 0.5 | 12/23/03 | **2** |
| SS-155-A | Discrete | 0 - 0.5 | 12/23/03 | **0.9** |
| SS-156-A | Discrete | 0 - 0.5 | 12/23/03 | **0.69** |
| SS-156-B | Discrete | 0.5 - 1.0 | 12/23/03 | **0.086** |
| SS-156-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.21** |
| SS-157-A | Discrete | 0 - 0.5 | 12/23/03 | **0.12** |
| SS-157-B | Discrete | 0.5 - 1.0 | 12/23/03 | **1.3** |
| SS-158-A | Discrete | 0 - 0.5 | 12/23/03 | **0.28** |
| SS-158-B | Discrete | 0.5 - 1.0 | 12/23/03 | **0.18** |
| SS-158-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.056** |

NOTES

mg/kg - milligrams per kilogram

Detections greater than 0.18 mg/kg are highlighted.

USEPA Region 9 Residential PRG for PCB-1260 - 0.22 mg/kg [EPA, 2002]

USEPA Region 9 Industrial PRG for PCB-1260 - 0.74 mg/kg [EPA, 2002]

# TABLE 4-2 (continued)
# SOIL CHEMICAL DETECTION SUMMARY
# POLYCHLORINATED BIPHENYL (PCB)
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

| Sample Name | Discrete/ Composite | Sample Depth | Sample Date | PCB-1260 (mg/kg) |
|---|---|---|---|---|
| SS-160-A | Discrete | 0 - 0.5 | 12/23/03 | **1.2** |
| SS-160-A(D) | Discrete | 0 - 0.5 | 12/23/03 | **0.14** |
| SS-160-B | Discrete | 0.5 - 1.0 | 12/23/03 | **0.65** |
| SS-160-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.014** |
| SS-161-A | Discrete | 0 - 0.5 | 12/23/03 | **110** |
| SS-161-A(S) | Discrete | 0 - 0.5 | 12/23/03 | **140** |
| SS-161-B | Discrete | 0.5 - 1.0 | 12/23/03 | **5.1** |
| SS-161-C | Discrete | 1.0 - 1.5 | 12/23/03 | **0.16** |
| SS-161-D | Discrete | 1.5 - 2.0 | 12/23/03 | **0.77** |
| SS-161-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.1** |
| SS-162-A | Discrete | 0 - 0.5 | 12/23/03 | **65** |
| SS-162-A(D) | Discrete | 0 - 0.5 | 12/23/03 | **53** |
| SS-162-B | Discrete | 0.5 - 1.0 | 12/23/03 | **9.5** |
| SS-162-C | Discrete | 1.0 - 1.5 | 12/23/03 | **0.081** |
| SS-162-D | Discrete | 1.5 - 2.0 | 12/23/03 | **0.043** |
| SS-162-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.63** |
| SS-163-A | Discrete | 0 - 0.5 | 12/23/03 | **0.61** |
| SS-163-B | Discrete | 0.5 - 1.0 | 12/23/03 | **0.22** |
| SS-163-C | Discrete | 1.0 - 1.5 | 12/23/03 | **0.15** |
| SS-163-D | Discrete | 1.5 - 2.0 | 12/23/03 | **0.046** |
| SS-163-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.088** |
| SS-164-A | Discrete | 0 - 0.5 | 12/23/03 | **4.3** |
| SS-164-B | Discrete | 0.5 - 1.0 | 12/23/03 | **0.28** |
| SS-164-C | Discrete | 1.0 - 1.5 | 12/23/03 | **0.058** |
| SS-164-D | Discrete | 1.5 - 2.0 | 12/23/03 | **0.027** |
| SS-164-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.018** |
| SS-165-A | Discrete | 0 - 0.5 | 12/23/03 | **0.16** |
| SS-165-B | Discrete | 0.5 - 1.0 | 12/23/03 | **4.7** |
| SS-165-C | Discrete | 1.0 - 1.5 | 12/23/03 | **0.21** |
| SS-165-D | Discrete | 1.5 - 2.0 | 12/23/03 | **0.37** |
| SS-165-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.041** |
| SS-166-A | Discrete | 0 - 0.5 | 12/23/03 | **590** |
| SS-166-A(D) | Discrete | 0 - 0.5 | 12/23/03 | **100** |
| SS-166-B | Discrete | 0.5 - 1.0 | 12/23/03 | **48** |
| SS-166-B(S) | Discrete | 0.5 - 1.0 | 12/23/03 | **57** |
| SS-166-C | Discrete | 1.0 - 1.5 | 12/23/03 | **19** |
| SS-166-D | Discrete | 1.5 - 2.0 | 12/23/03 | **0.26** |
| SS-166-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.075** |
| SS-167-A | Discrete | 0 - 0.5 | 12/23/03 | **120** |
| SS-167-B | Discrete | 0.5 - 1.0 | 12/23/03 | **1.3** |

NOTES

mg/kg - milligrams per kilogram

Detections greater than 0.18 mg/kg are highlighted.

USEPA Region 9 Residential PRG for Total PCBs - 0.22 mg/kg [EPA, 2002]

USEPA Region 9 Industrial PRG for PCB-1260 - 0.74 mg/kg [EPA, 2002]

# TABLE 4-2 (continued)
# SOIL CHEMICAL DETECTION SUMMARY
# POLYCHLORINATED BIPHENYL (PCB)
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

| Sample Name | Discrete/ Composite | Sample Depth | Sample Date | PCB-1260 (mg/kg) |
|---|---|---|---|---|
| SS-167-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.038** |
| SS-168-A | Discrete | 0 - 0.5 | 12/23/03 | **52** |
| SS-168-B | Discrete | 0.5 - 1.0 | 12/23/03 | **8.3** |
| SS-168-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.021** |
| SS-169-A | Discrete | 0 - 0.5 | 12/23/03 | **0.22** |
| SS-169-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.46** |
| SS-170-A(S) | Discrete | 0 - 0.5 | 12/23/03 | **0.052** |
| SS-172-A | Discrete | 0 - 0.5 | 12/23/03 | **0.34** |
| SS-172-D | Discrete | 1.5 - 2.0 | 12/23/03 | **0.013** |
| SS-172-E | Discrete | 2.0 - 2.5 | 12/23/03 | **0.013** |
| SS-173 | Asphalt Only | Surface | 12/23/03 | **2.4** |
| SS-89-A | Discrete | 0 - 0.5 | 09/17/03 | **25** |
| SS-89-A (S) | Discrete | 0 - 0.5 | 09/17/03 | **60** |
| SS-89-B | Discrete | 2 - 2.5 | 09/17/03 | **0.044** |
| SS-89-B (S) | Discrete | 2 - 2.5 | 09/17/03 | **0.19** |
| SS-89-C | Discrete | 4 - 4.5 | 09/17/03 | **0.3** |
| SS-90-A | Discrete | 0 - 0.5 | 09/17/03 | **41** |
| SS-90-A (S) | Discrete | 0 - 0.5 | 09/17/03 | **55** |
| SS-90-B | Discrete | 2 - 2.5 | 09/17/03 | **0.21** |
| SS-90-B (S) | Discrete | 2 - 2.5 | 09/17/03 | **0.3** |
| SS-90-C | Discrete | 4 - 4.5 | 09/17/03 | **0.1** |
| SS-91-A | Discrete | 0 - 0.5 | 09/17/03 | **53** |
| SS-91-A (S) | Discrete | 0 - 0.5 | 09/17/03 | **100** |
| SS-91-B | Discrete | 2 - 2.5 | 09/17/03 | **10** |
| SS-91-B (S) | Discrete | 2 - 2.5 | 09/17/03 | **35** |
| SS-91-C | Discrete | 4 - 4.5 | 09/17/03 | **0.67** |
| SS-91-D | Discrete | 6 - 6.5 | 09/17/03 | **0.035** |
| SS-92-A | Discrete | 0 - 0.5 | 09/17/03 | **0.53** |
| SS-92-A (S) | Discrete | 0 - 0.5 | 09/17/03 | **0.6** |
| SS-92-B | Discrete | 2 - 2.5 | 09/17/03 | **0.029** |
| SS-92-B (S) | Discrete | 2 - 2.5 | 09/17/03 | **0.11** |
| SS-93-A | Discrete | 0 - 0.5 | 09/17/03 | **12** |
| SS-93-A (S) | Discrete | 0 - 0.5 | 09/17/03 | **19** |
| SS-93-B | Discrete | 2 - 2.5 | 09/17/03 | **0.53** |
| SS-93-B (S) | Discrete | 2 - 2.5 | 09/17/03 | **2.6** |
| SS-93-C | Discrete | 4 - 4.5 | 09/17/03 | **0.21** |
| SS-93-D | Discrete | 6 - 6.5 | 09/17/03 | **0.05** |
| SS-94-A | Discrete | 0 - 0.5 | 09/17/03 | **0.78** |
| SS-94-A (S) | Discrete | 0 - 0.5 | 09/17/03 | **1.2** |
| SS-94-C | Discrete | 4 - 4.5 | 09/17/03 | **0.51** |
| SS-95-A | Discrete | 0 - 0.5 | 09/17/03 | **0.041** |

NOTES

mg/kg - milligrams per kilogram

Detections greater than 0.18 mg/kg are highlighted.

USEPA Region 9 Residential PRG for Total PCBs - 0.22 mg/kg [EPA, 2002]

USEPA Region 9 Industrial PRG for PCB-1260 - 0.74 mg/kg [EPA, 2002]

# TABLE 4-3
# SOIL CHEMICAL DETECTION SUMMARY
# POLYNUCLEAR AROMATIC HYDROCARBON
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

| Discrete Sample Name | Sample Depth | Sample Date | Acenaphthene (mg/kg) | Acenaphthylene (mg/kg) | Anthracene (mg/kg) | Benzo[a]anthracene (mg/kg) | Benzo[a]pyrene (mg/kg) | Benzo[b]fluoranthene (mg/kg) | Benzo[g,h,I]perylene (mg/kg) | Benzo[k]fluoranthene (mg/kg) | Chrysene (mg/kg) | Dibenzo[a,h]anthracene (mg/kg) | Fluoranthene (mg/kg) | Fluorene (mg/kg) | Indeno[1,2,3-cd]pyrene (mg/kg) | Naphthalene (mg/kg) | Phenanthrene (mg/kg) | Pyrene (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Residential PRG (mg/kg)[1]** | | | **3,700** | **3,700** | **22,000** | **1** | **0** | **1** | **-** | **6** | **62** | **0** | **2,300** | **2,700** | **1** | **6** | **-** | **2,300** |
| **Industrial PRG (mg/kg)[1]** | | | **29,000** | **29,000** | **100,000** | **2** | **0** | **2** | **-** | **2** | **210** | **0** | **22,000** | **26,000** | **2** | **190** | **-** | **29,000** |
| SS-89-A | 0 - 0.5 | 09/17/03 | <0.1 | <0.05 | <0.01 | <0.01 | **0.27** | <0.01 | **0.11** | <0.01 | **0.19** | **0.11** | <0.02 | <0.01 | <0.01 | <0.05 | <0.01 | <0.02 |
| SS-91-A | 0 - 0.5 | 09/17/03 | <0.1 | <0.05 | <0.01 | <0.01 | **0.048** | <0.01 | <0.02 | <0.01 | <0.01 | <0.06 | <0.02 | <0.01 | <0.01 | <0.05 | <0.01 | <0.02 |
| SS-91-A(S) | 0 - 0.5 | 09/17/03 | <0.01 | <0.01 | <0.01 | **0.01 J** | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| SS-91-B | 2 - 2.5 | 09/17/03 | <0.1 | <0.05 | <0.01 | <0.01 | **0.11** | <0.01 | <0.02 | <0.01 | **0.01** | <0.06 | <0.02 | <0.01 | <0.01 | <0.05 | <0.01 | <0.02 |
| SS-93-A | 0 - 0.5 | 09/17/03 | <0.1 | <0.05 | <0.01 | <0.01 | **0.068** | <0.01 | <0.02 | <0.01 | <0.01 | <0.06 | <0.02 | <0.01 | <0.01 | <0.05 | <0.01 | <0.02 |
| SS-102-D | 6 - 6.5 | 09/16/03 | <0.1 | <0.05 | <0.01 | <0.01 | <0.02 | **0.033** | <0.02 | <0.01 | <0.01 | <0.06 | <0.02 | <0.01 | <0.01 | <0.05 | <0.01 | <0.02 |
| SS-103-A | 0 - 0.5 | 09/17/03 | <3 | <1.5 | <0.3 | <0.3 | <0.6 | <0.3 | <0.6 | <0.3 | <0.3 | <1.8 | <0.6 | **0.57** | <0.3 | <1.5 | <0.3 | <0.6 |
| SS-103-A (D) | 0 - 0.5 | 09/17/03 | **4.5** | <1.1 | <0.2 | <0.2 | <0.4 | **0.2** | <0.4 | **0.4** | <0.2 | <1.3 | <0.4 | <0.2 | <0.2 | <1.1 | <0.2 | <0.4 |
| SS-103-C | 4 - 4.5 | 09/17/03 | **3.2** | <1.1 | <0.2 | <0.2 | <0.4 | <0.2 | <0.4 | <0.2 | <0.2 | <1.3 | <0.4 | <0.2 | <0.2 | <1.1 | <0.2 | <0.4 |
| SS-104-A | 0 - 0.5 | 09/16/03 | <0.1 | <0.05 | <0.01 | **0.064** | **0.066** | **0.041** | <0.02 | **0.02** | **0.065** | <0.06 | **0.26** | <0.01 | **0.017** | <0.05 | **0.11** | **0.23** |
| SS-104-C | 4 - 4.5 | 09/16/03 | <0.1 | <0.05 | <0.01 | **0.022** | **0.031** | **0.019** | <0.02 | <0.01 | **0.025** | <0.06 | **0.079** | <0.01 | **0.013** | <0.05 | **0.03** | **0.071** |
| SS-124-A | 0 - 0.5 | 09/10/03 | <0.1 | <0.05 | <0.01 | <0.01 | <0.02 | **0.086** | **0.022** | <0.01 | <0.01 | <0.06 | <0.02 | <0.01 | <0.01 | <0.05 | <0.01 | <0.02 |
| SS-134-A | 0 - 0.5 | 09/17/03 | **3.3** | **0.94** | **0.27** | <0.2 | <0.4 | <0.2 | <0.4 | <0.2 | <0.2 | <1 | **0.46** | **0.28** | <0.2 | <0.9 | <0.2 | **0.89** |
| SS-136-A | 0 - 0.5 | 09/17/03 | <0.1 | <0.05 | <0.01 | **0.077** | <0.02 | <0.01 | <0.02 | <0.01 | <0.01 | <0.06 | <0.02 | <0.01 | <0.01 | <0.05 | <0.01 | <0.02 |

NOTES

(1) USEPA Region 9 Preliminary Remediation Goal [EPA, 2002]

mg/kg - milligrams per kilogram

Detections are presented in **BOLD**.

Detections greater than Residential PRG are highlighted

Benzo[a]pyrene detection exceeded Industrial PRG in SS-89-A

# TABLE 4-4
# SOIL CHEMICAL DETECTION SUMMARY
# TITLE 22 METALS
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

| | | Bolsa Chica | NA | 11 | 92 | 0.88 | 0.66 | 43 | 10 | 30 | 48 | 0.23 | NA | 30 | 54 | 0.19 | 0.52 | 72 | 92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Discrete Sample Name** | **Sample Depth** | **Sample Date** | **Antimony (mg/kg)** | **Arsenic (mg/kg)** | **Barium (mg/kg)** | **Beryllium (mg/kg)** | **Cadmium (mg/kg)** | **Chromium (mg/kg)** | **Cobalt (mg/Kg)** | **Copper (mg/kg)** | **Lead (mg/kg)** | **Mercury (mg/Kg)** | **Molybdenum (mg/kg)** | **Nickel (mg/kg)** | **Selenium (mg/kg)** | **Silver (mg/kg)** | **Thallium (mg/kg)** | **Vanadium (mg/kg)** | **Zinc (mg/kg)** |
| **Residential PRG[(1)]** | | | **31** | **22** | **5,400** | **150** | **37** | **210** | **900** | **310** | **150** | **23** | **390** | **1,600** | **390** | **390** | **5** | **550** | **23,000** |
| **Industrial PRG[(1)]** | | | **410** | **260** | **67,000** | **1,900** | **450** | **450** | **1,900** | **41,000** | **750** | **310** | **5,100** | **20,000** | **5,100** | **5,100** | **67** | **7,200** | **100,000** |
| SS-64C4-A(D) | 0 - 0.5 | 09/10/03 | <5 | **3.8** | **64** | **0.51** | <0.5 | **18** | **7** | **15** | **9.4** | <0.2 | <2.5 | **13** | <0.5 | <0.5 | <5 | **33** | **53** |
| SS-64C4-B(D) | 2 - 2.5 | 09/10/03 | <10 | **4** | **110** | <1 | <1 | **34** | **10** | **27** | **9.7** | <0.2 | <5 | **21** | <2.5 | <1 | <10 | **69** | **76** |
| SS-64C4-C(D) | 4 - 4.5 | 09/10/03 | <5 | **4.1** | **66** | **0.59** | <0.5 | **23** | **6.8** | **17** | **6.5** | <0.2 | <2.5 | **13** | <0.5 | <0.5 | <5 | **40** | **51** |
| SS-64C4-D(D) | 6 - 6.5 | 09/10/03 | <5 | **4.6** | **22** | <0.5 | <0.5 | **8.5** | **3.1** | **5** | <2.5 | <0.2 | <2.5 | **5.4** | <0.5 | <0.5 | <5 | **17** | **19** |
| SS-67C2-A | 0 - 0.5 | 09/11/03 | <5 | **6.8** | **110** | **0.67** | <0.5 | **22** | **8.1** | **23** | **11** | <0.2 | <2.5 | **15** | <0.5 | <0.5 | <5 | **46** | **61** |
| SS-67C2-B | 2 - 2.5 | 09/11/03 | <5 | **5.7** | **48** | **0.84** | <0.5 | **26** | **8** | **25** | **10** | <0.2 | <2.5 | **15** | <0.5 | <0.5 | <5 | **47** | **59** |
| SS-67C2-C | 4 - 4.5 | 09/11/03 | <10 | **5** | **120** | <1 | <1 | **28** | **10** | **38** | **14** | <0.2 | <5 | **18** | <1 | <1 | <10 | **55** | **87** |
| SS-67C2-D | 6 - 6.5 | 09/11/03 | <5 | **1** | **30** | <0.5 | <0.5 | **8.7** | **2.9** | **3.7** | <2.5 | <0.2 | <2.5 | **4.9** | <0.5 | <0.5 | <5 | **17** | **17** |
| SS-80-C4-A | 0 - 0.5 | 09/09/03 | <10 | **10** | **85** | **1** | <1 | **35** | **13** | **19** | **65** | <0.2 | <5 | **25** | <1 | <1 | <10 | **65** | **87** |
| SS-80-C4-B | 2 - 2.5 | 09/09/03 | <5 | **7.6** | **71** | <0.5 | <0.5 | **22** | **4.4** | **18** | **5.7** | <0.2 | <2.5 | **8.4** | <0.5 | <0.5 | <5 | **40** | **38** |
| SS-80-C4-C | 4 - 4.5 | 09/09/03 | <10 | **5** | **93** | <1 | <1 | **27** | **8.2** | **19** | **12** | <0.2 | <5 | **17** | <1 | <1 | <10 | **53** | **70** |
| SS-80-C4-D | 6 - 6.5 | 09/09/03 | <5 | **2** | **26** | <0.5 | <0.5 | **8** | **2.7** | **4.7** | <2.5 | <0.2 | <2.5 | **4.3** | <0.5 | <0.5 | <5 | **19** | **17** |
| SS-89-A | 0 - 0.5 | 09/17/03 | <10 | **7.6** | **86** | <1 | <1 | **28** | **9.3** | **24** | **13** | <0.2 | <5 | **17** | <1 | <1 | <10 | **52** | **78** |
| SS-89-A (S) | 0 - 0.5 | 09/17/03 | **1.8** | <1 | **82** | <1 | <1 | **25** | **11** | **17** | **14** | <0.1 | **1.1** | **16** | <1 | <1 | <1 | **54** | **79** |
| SS-89-B | 2 - 2.5 | 09/17/03 | <10 | **5.3** | **83** | <1 | <1 | **24** | **9** | **18** | **9.3** | <0.2 | <5 | **16** | <1 | <1 | <10 | **47** | **61** |
| SS-89-B (S) | 2 - 2.5 | 09/17/03 | **2.1** | <1 | **79** | <1 | <1 | **23** | **11** | **13** | **9** | <0.1 | **1.2** | **15** | <1 | <1 | <1 | **49** | **60** |
| SS-90-A | 0 - 0.5 | 09/17/03 | <10 | **7.8** | **88** | <1 | <1 | **30** | **10** | **22** | **18** | <0.2 | <5 | **19** | <1 | <1 | <10 | **57** | **83** |
| SS-90-A (S) | 0 - 0.5 | 09/17/03 | <2 | <1 | **58** | <1 | <1 | **24** | **8.7** | **11** | **14** | <0.1 | <1 | **15** | <1 | <1 | <1 | **44** | **58** |
| SS-90-B | 2 - 2.5 | 09/17/03 | <10 | **13** | **71** | <1 | <1 | **35** | **7.9** | **35** | **15** | <0.2 | <5 | **16** | <1 | <1 | <10 | **76** | **66** |
| SS-90-B (S) | 2 - 2.5 | 09/17/03 | <2 | **4.1** | **64** | <1 | <1 | **29** | **9** | **19** | **9.9** | <0.1 | **3** | **13** | <1 | <1 | <1 | **64** | **62** |
| SS-91-A | 0 - 0.5 | 09/17/03 | <10 | **5.9** | **84** | <1 | <1 | **26** | **9.9** | **20** | **14** | <0.2 | <5 | **17** | <1 | <1 | <10 | **51** | **77** |
| SS-91-A (S) | 0 - 0.5 | 09/17/03 | <2 | <1 | **76** | <1 | <1 | **23** | **11** | **13** | **13** | <0.1 | <1 | **15** | <1 | <1 | <1 | **51** | **71** |
| SS-91-B | 2 - 2.5 | 09/17/03 | <10 | **5** | **71** | <1 | <1 | **20** | **8.9** | **14** | **7.6** | <0.2 | <5 | **13** | <1 | <1 | <10 | **40** | **49** |
| SS-91-B (S) | 2 - 2.5 | 09/17/03 | <1 | <1 | **73** | <1 | <1 | **19** | **9.2** | **9.1** | **8.1** | <0.1 | <1 | **12** | <1 | <1 | <1 | **42** | **53** |
| SS-92-A | 0 - 0.5 | 09/17/03 | <10 | **5** | **78** | <1 | <1 | **23** | **8.5** | **16** | **9.7** | <0.2 | <5 | **15** | <1 | <1 | <10 | **46** | **52** |
| SS-92-A (S) | 0 - 0.5 | 09/17/03 | <1 | <1 | **71** | <1 | <1 | **20** | **9.5** | **11** | **9.8** | <0.1 | <1 | **13** | <1 | <1 | <1 | **45** | **50** |
| SS-92-B | 2 - 2.5 | 09/17/03 | <10 | **4** | **86** | <1 | <1 | **21** | **8.6** | **16** | **5.6** | <0.2 | <5 | **14** | <1 | <1 | <10 | **42** | **49** |
| SS-92-B (S) | 2 - 2.5 | 09/17/03 | <1 | <1 | **77** | <1 | <1 | **18** | **8.6** | **9** | **5.1** | <0.1 | <1 | **12** | <1 | <1 | <1 | **38** | **43** |
| SS-93-A | 0 - 0.5 | 09/17/03 | <10 | **5.3** | **100** | <1 | <1 | **29** | **11** | **23** | **11** | <0.2 | <5 | **19** | <1 | <1 | <10 | **56** | **75** |
| SS-93-A (S) | 0 - 0.5 | 09/17/03 | <2 | <1 | **81** | <1 | <1 | **22** | **11** | **14** | **11** | <0.1 | <1 | **15** | <1 | <1 | <1 | **50** | **65** |
| SS-93-B | 2 - 2.5 | 09/17/03 | <5 | **5.9** | **87** | **0.71** | <0.5 | **25** | **9.3** | **20** | **9.9** | <0.2 | <2.5 | **16** | <0.5 | <0.5 | <5 | **51** | **64** |
| SS-93-B (S) | 2 - 2.5 | 09/17/03 | <2 | <1 | **78** | <1 | <1 | **22** | **10** | **13** | **11** | <0.1 | <1 | **15** | <1 | <1 | <1 | **48** | **65** |
| SS-94-A | 0 - 0.5 | 09/17/03 | <10 | **5.2** | **100** | <1 | <1 | **30** | **9.9** | **22** | **13** | <0.2 | <5 | **18** | <1 | <1 | <10 | **58** | **84** |
| SS-94-A (S) | 0 - 0.5 | 09/17/03 | <2 | <1 | **85** | <1 | <1 | **25** | **11** | **15** | **14** | <0.1 | <1 | **17** | <1 | <1 | <1 | **56** | **79** |
| SS-94-B | 2 - 2.5 | 09/17/03 | <10 | **12** | **95** | **1.3** | <1 | **36** | **10** | **25** | **27** | <0.2 | <5 | **22** | <1 | <1 | <10 | **73** | **86** |
| SS-94-B (S) | 2 - 2.5 | 09/17/03 | **3.1** | <2 | **98** | <1 | <1 | **31** | **12** | **16** | **31** | <0.1 | **2.6** | **20** | <1 | <1 | <1 | **72** | **80** |
| SS-95-A | 0 - 0.5 | 09/17/03 | <10 | **3** | **74** | <1 | <1 | **19** | **6.6** | **14** | **6.1** | <0.2 | <5 | **11** | <1 | <1 | <10 | **41** | **52** |
| SS-95-B | 2 - 2.5 | 09/17/03 | <10 | **4** | **91** | <1 | <1 | **19** | **7.9** | **19** | <5 | <0.2 | <5 | **15** | <1 | <1 | <10 | **44** | **59** |
| SS-96-A | 0 - 0.5 | 09/17/03 | <10 | **7.4** | **88** | <1 | <1 | **30** | **8.5** | **26** | **10** | <0.2 | <5 | **16** | <1 | <1 | <10 | **57** | **69** |

NOTES:

(1) USEPA Region 9 Preliminary Remediation Goal [EPA, 2002]

mg/kg - milligrams per kilogram

Detections are presented in **BOLD**.

# TABLE 4-4 (continued)
# SOIL CHEMICAL DETECTION SUMMARY
# TITLE 22 METALS
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

| Discrete Sample Name | Sample Depth | Sample Date | Antimony (mg/kg) | Arsenic (mg/kg) | Barium (mg/kg) | Beryllium (mg/kg) | Cadmium (mg/kg) | Chromium (mg/kg) | Cobalt (mg/Kg) | Copper (mg/kg) | Lead (mg/kg) | Mercury (mg/Kg) | Molybdenum (mg/kg) | Nickel (mg/kg) | Selenium (mg/kg) | Silver (mg/kg) | Thallium (mg/kg) | Vanadium (mg/kg) | Zinc (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Residential PRG[(1)]** | | | **31** | **22** | **5,400** | **150** | **37** | **210** | **900** | **310** | **150** | **23** | **390** | **1,600** | **390** | **390** | **5.2** | **550** | **23,000** |
| **Industrial PRG[(1)]** | | | **410** | **260** | **67,000** | **1,900** | **450** | **450** | **1,900** | **41,000** | **750** | **310** | **5,100** | **20,000** | **5,100** | **5,100** | **67** | **7,200** | **100,000** |
| SS-96-B | 2 - 2.5 | 09/17/03 | <10 | **5** | **79** | <1 | <1 | **17** | **5.9** | **12** | <5 | <0.2 | <5 | **9.4** | <1 | <1 | <10 | **39** | **46** |
| SS-97-A | 0 - 0.5 | 09/17/03 | <10 | **8.3** | **84** | **1** | <1 | **34** | **11** | **22** | **11** | <0.2 | <5 | **21** | <1 | <1 | <10 | **65** | **82** |
| SS-97-A (D) | 0 - 0.5 | 09/17/03 | <10 | **9.4** | **81** | <1 | <1 | **30** | **11** | **21** | **12** | <0.2 | <5 | **20** | <1 | <1 | <10 | **58** | **76** |
| SS-97-B | 2 - 2.5 | 09/17/03 | <10 | **14** | **110** | <1 | <1 | **31** | **10** | **28** | **9.3** | <0.2 | <5 | **19** | <1 | <1 | <10 | **60** | **80** |
| SS-98-A | 0 - 0.5 | 09/12/03 | <5 | **7.4** | **98** | **0.59** | <0.5 | **24** | **9** | **26** | **17** | <0.2 | <2.5 | **16** | <0.5 | <0.5 | <5 | **42** | **100** |
| SS-98-B | 2 - 2.5 | 09/12/03 | <5 | **4.9** | **75** | **0.68** | <0.5 | **22** | **8.7** | **18** | **9.7** | <0.2 | <2.5 | **16** | <0.5 | <0.5 | <5 | **42** | **55** |
| SS-98-C | 4 - 4.5 | 09/12/03 | <5 | **4.2** | **72** | **0.68** | <0.5 | **23** | **9.2** | **17** | **9.3** | <0.2 | <2.5 | **16** | <0.5 | <0.5 | <5 | **42** | **53** |
| SS-98-D | 6 - 6.5 | 09/12/03 | <5 | **3.8** | **92** | **0.62** | <0.5 | **20** | **7.9** | **15** | **5.9** | <0.2 | <2.5 | **14** | <0.5 | <0.5 | <5 | **39** | **45** |
| SS-99-A | 0 - 0.5 | 09/12/03 | <5 | **3.7** | **65** | <0.5 | <0.5 | **19** | **6.7** | **14** | **5.7** | <0.2 | <2.5 | **12** | <0.5 | <0.5 | <5 | **36** | **48** |
| SS-99-B | 2 - 2.5 | 09/12/03 | <5 | **4** | **73** | **0.57** | <0.5 | **19** | **7.5** | **16** | **7.5** | <0.2 | <2.5 | **14** | <0.5 | <0.5 | <5 | **37** | **47** |
| SS-99-C | 4 - 4.5 | 09/12/03 | <5 | **3.7** | **62** | **0.5** | <0.5 | **18** | **6.9** | **14** | **6.2** | <0.2 | <2.5 | **12** | <0.5 | <0.5 | <5 | **35** | **48** |
| SS-99-D | 6 - 6.5 | 09/12/03 | <5 | **4.4** | **73** | **0.57** | <0.5 | **20** | **7.6** | **16** | **7.4** | <0.2 | <2.5 | **13** | <0.5 | <0.5 | <5 | **40** | **51** |
| SS-100-A | 0 - 0.5 | 09/16/03 | <5 | **5.8** | **76** | **0.73** | <0.5 | **23** | **7.3** | **18** | **6.4** | <0.2 | <2.5 | **15** | <0.5 | <0.5 | <5 | **44** | **51** |
| SS-100-A (S) | 0 - 0.5 | 09/16/03 | <2 | <1 | **73** | <1 | <1 | **20** | **9.4** | **11** | **7.4** | <0.1 | **1.1** | **15** | <1 | <1 | <1 | **44** | **56** |
| SS-100-B | 2 - 2.5 | 09/16/03 | <5 | **4.6** | **64** | **0.65** | <0.5 | **20** | **6.4** | **17** | **6.5** | <0.2 | <2.5 | **15** | <0.5 | <0.5 | <5 | **39** | **44** |
| SS-100-C | 4 - 4.5 | 09/16/03 | <5 | **5.7** | **110** | **0.78** | <0.5 | **24** | **7.9** | **19** | **6.6** | <0.2 | <2.5 | **17** | <0.5 | <0.5 | <5 | **47** | **52** |
| SS-100-D | 6 - 6.5 | 09/16/03 | <10 | **15** | **65** | <1 | <1 | **36** | **8.3** | **29** | **9.5** | <0.2 | <5 | **16** | <1 | <1 | <10 | **73** | **68** |
| SS-101-A | 0 - 0.5 | 09/16/03 | <5 | **4.4** | **71** | <0.5 | <0.5 | **13** | **4.4** | **11** | **6.4** | <0.2 | <2.5 | **15** | <0.5 | <0.5 | <5 | **34** | **35** |
| SS-101-B | 2 - 2.5 | 09/16/03 | <5 | **4.8** | **82** | **0.68** | <0.5 | **20** | **7.5** | **18** | **7.4** | <0.2 | <2.5 | **14** | <0.5 | <0.5 | <5 | **39** | **48** |
| SS-101-C | 4 - 4.5 | 09/16/03 | <5 | **4.3** | **75** | **0.5** | <0.5 | **15** | **5.3** | **14** | **8.3** | <0.2 | <2.5 | **15** | <0.5 | <0.5 | <5 | **34** | **43** |
| SS-101-D | 6 - 6.5 | 09/16/03 | <10 | **4** | **110** | <1 | <1 | **25** | **9.6** | **17** | <5 | <0.2 | <5 | **15** | <1 | <1 | <10 | **50** | **69** |
| SS-102-A | 0 - 0.5 | 09/16/03 | <5 | **4.8** | **80** | **0.69** | <0.5 | **22** | **7.7** | **17** | **7.1** | <0.2 | <2.5 | **15** | <0.5 | <0.5 | <5 | **42** | **53** |
| SS-102-B | 2 - 2.5 | 09/16/03 | <10 | **3** | **71** | <1 | <1 | **19** | **8.7** | **13** | <5 | <0.2 | <5 | **13** | <1 | <1 | <10 | **39** | **46** |
| SS-102-C | 4 - 4.5 | 09/16/03 | <10 | **5** | **88** | <1 | <1 | **24** | **9.5** | **18** | **8.6** | <0.2 | <5 | **16** | <1 | <1 | <10 | **47** | **74** |
| SS-102-D | 6 - 6.5 | 09/16/03 | <10 | **6.6** | **78** | **1.4** | <1 | **27** | **12** | **21** | **11** | <0.2 | <5 | **20** | <1 | <1 | <10 | **54** | **86** |
| SS-103-A | 0 - 0.5 | 09/17/03 | <10 | **5.8** | **100** | <1 | <1 | **13** | <5 | **13** | <5 | <0.2 | <5 | **20** | <1 | <1 | <10 | **41** | **52** |
| SS-103-A (D) | 0 - 0.5 | 09/17/03 | <5 | **6.3** | **96** | <0.5 | <0.5 | **13** | **4.5** | **14** | **4.6** | <0.2 | <2.5 | **20** | <0.5 | <0.5 | <5 | **39** | **35** |
| SS-103-B | 2 - 2.5 | 09/17/03 | <5 | **5.5** | **86** | **0.53** | <0.5 | **19** | **6.9** | **17** | **6.9** | <0.2 | <2.5 | **22** | <0.5 | <0.5 | <5 | **47** | **54** |
| SS-103-C | 4 - 4.5 | 09/17/03 | <5 | **5.8** | **80** | <0.5 | <0.5 | **15** | **4.4** | **15** | **5.8** | <0.2 | <2.5 | **22** | <0.5 | <0.5 | <5 | **41** | **37** |
| SS-103-D | 6 - 6.5 | 09/17/03 | <5 | **1** | **35** | <0.5 | <0.5 | **11** | **3.7** | **6** | <2.5 | <0.2 | <2.5 | **6.5** | <0.5 | <0.5 | <5 | **23** | **23** |
| SS-104-A | 0 - 0.5 | 09/16/03 | <10 | **11** | **71** | <1 | <1 | **36** | **9** | **32** | **10** | <0.2 | <5 | **18** | <2.5 | <1 | <10 | **78** | **71** |
| SS-104-B | 2 - 2.5 | 09/16/03 | <10 | **3** | **120** | <1 | <1 | **23** | **11** | **17** | <5 | <0.2 | <5 | **18** | <1 | <1 | <10 | **50** | **71** |
| SS-104-B (S) | 2 - 2.5 | 09/16/03 | **2.2** | <1 | **92** | <1 | <1 | **19** | **12** | **11** | **4.2** | <0.1 | <1 | **16** | <1 | <1 | <1 | **45** | **65** |
| SS-104-C | 4 - 4.5 | 09/16/03 | <10 | **5.2** | **99** | <1 | <1 | **22** | **9.2** | **20** | **21** | <0.2 | <5 | **16** | <1 | <1 | <10 | **47** | **94** |
| SS-104-D | 6 - 6.5 | 09/16/03 | <10 | **3** | **110** | <1 | <1 | **23** | **9.4** | **15** | <5 | <0.2 | <5 | **15** | <1 | <1 | <10 | **49** | **62** |
| SS-105-A | 0 - 0.5 | 09/16/03 | <10 | **4** | **65** | <1 | <1 | **12** | <5 | **12** | <5 | <0.2 | <5 | **19** | <1 | <1 | <10 | **34** | **37** |
| SS-105-B | 2 - 2.5 | 09/16/03 | <10 | **3** | **67** | <1 | <1 | **15** | **7.2** | **10** | <5 | <0.2 | <5 | **11** | <1 | <1 | <10 | **36** | **41** |
| SS-105-C | 4 - 4.5 | 09/16/03 | <10 | **6.4** | **95** | <1 | <1 | **24** | **8.7** | **27** | **63** | **0.25** | <5 | **17** | <1 | <1 | <10 | **48** | **180** |
| SS-105-D | 6 - 6.5 | 09/16/03 | <10 | **6.6** | **62** | <1 | <1 | **16** | **6.1** | **14** | **5** | <0.2 | <5 | **17** | <1 | <1 | <10 | **42** | **49** |

NOTES:

(1) USEPA Region 9 Preliminary Remediation Goal [EPA, 2002]

mg/kg - milligrams per kilogram

Detections are presented in **BOLD**.

# TABLE 4-4 (continued)
# SOIL CHEMICAL DETECTION SUMMARY
# TITLE 22 METALS
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA

| Discrete Sample Name | Sample Depth | Sample Date | Antimony (mg/kg) | Arsenic (mg/kg) | Barium (mg/kg) | Beryllium (mg/kg) | Cadmium (mg/kg) | Chromium (mg/kg) | Cobalt (mg/Kg) | Copper (mg/kg) | Lead (mg/kg) | Mercury (mg/Kg) | Molybdenum (mg/kg) | Nickel (mg/kg) | Selenium (mg/kg) | Silver (mg/kg) | Thallium (mg/kg) | Vanadium (mg/kg) | Zinc (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Residential PRG[(1)]** | | | **31** | **22** | **5,400** | **150** | **37** | **210** | **900** | **310** | **150** | **23** | **390** | **1,600** | **390** | **390** | **5.2** | **550** | **23,000** |
| **Industrial PRG[(1)]** | | | **410** | **260** | **67,000** | **1,900** | **450** | **450** | **1,900** | **41,000** | **750** | **310** | **5,100** | **20,000** | **5,100** | **5,100** | **67** | **7,200** | **100,000** |
| SS-106-A | 0 - 0.5 | 09/16/03 | <10 | **4** | **69** | <1 | <1 | **20** | **6.8** | **14** | **7.3** | <0.2 | <5 | **13** | <1 | <1 | <10 | **38** | **47** |
| SS-106-B | 2 - 2.5 | 09/16/03 | <10 | **5.8** | **75** | <1 | <1 | **22** | **7.7** | **17** | **13** | <0.2 | <5 | **14** | <1 | <1 | <10 | **43** | **52** |
| SS-106-C | 4 - 4.5 | 09/16/03 | <10 | **4** | **77** | <1 | <1 | **23** | **7.1** | **16** | **7.7** | <0.2 | <5 | **15** | <1 | <1 | <10 | **41** | **50** |
| SS-106-D | 6 - 6.5 | 09/16/03 | <10 | **2** | **96** | <1 | <1 | **19** | **7.9** | **11** | <5 | <0.2 | <5 | **12** | <1 | <1 | <10 | **42** | **54** |
| SS-107-A | 0 - 0.5 | 09/10/03 | <5 | **3.1** | **45** | <0.5 | <0.5 | **11** | **3.6** | **6.3** | **5.1** | <0.2 | <2.5 | **6.8** | <0.5 | <0.5 | <5 | **21** | **28** |
| SS-107-B | 2 - 2.5 | 09/10/03 | <10 | **11** | **69** | **1** | <1 | **36** | **9.7** | **29** | **10** | <0.2 | <5 | **20** | <1 | <1 | <10 | **70** | **75** |
| SS-107-C | 4 - 4.5 | 09/10/03 | <5 | **3** | **46** | <0.5 | <0.5 | **12** | **3.9** | **6.7** | **4.9** | <0.2 | <2.5 | **7.3** | <0.5 | <0.5 | <5 | **21** | **31** |
| SS-107-D | 6 - 6.5 | 09/10/03 | <5 | **5.3** | **51** | <0.5 | <0.5 | **17** | **5.2** | **13** | <2.5 | <0.2 | <2.5 | **9.2** | <0.5 | <0.5 | <5 | **30** | **32** |
| SS-134-A | 0 - 0.5 | 09/17/03 | <10 | **4** | **46** | <1 | <1 | **8.9** | <5 | **11** | <5 | <0.2 | <5 | **17** | <1 | <1 | <10 | **30** | **28** |
| SS-134-B | 2 - 2.5 | 09/17/03 | <10 | **4** | **66** | **1** | <1 | **55** | **8.3** | **17** | **13** | <0.2 | <5 | **30** | <1 | <1 | <10 | **44** | **78** |
| SS-134-C | 4 - 4.5 | 09/17/03 | <10 | **5** | **65** | <1 | <1 | **23** | **7.4** | **18** | **6.7** | <0.2 | <5 | **16** | <1 | <1 | <10 | **40** | **56** |
| SS-134-D | 6 - 6.5 | 09/17/03 | <10 | **6.5** | **100** | <1 | <1 | **20** | **9.6** | **17** | **5.5** | <0.2 | <5 | **15** | <1 | <1 | <10 | **44** | **62** |
| SS-135-A | 0 - 0.5 | 09/16/03 | <10 | **6.3** | **83** | <1 | <1 | **23** | **7.5** | **19** | **11** | <0.2 | <5 | **14** | <1 | <1 | <10 | **42** | **69** |
| SS-135-B | 2 - 2.5 | 09/16/03 | <10 | **6.2** | **83** | <1 | <1 | **26** | **8.9** | **20** | **8.1** | <0.2 | <5 | **16** | <1 | <1 | <10 | **50** | **66** |
| SS-135-C | 4 - 4.5 | 09/16/03 | <10 | **6.6** | **92** | <1 | <1 | **23** | **7.1** | **18** | **14** | <0.2 | <5 | **13** | <1 | <1 | <10 | **40** | **68** |
| SS-135-D | 6 - 6.5 | 09/16/03 | <10 | **6.4** | **59** | <1 | <1 | **22** | **8.3** | **13** | <5 | <0.2 | <5 | **15** | <1 | <1 | <10 | **43** | **62** |
| SS-136-A | 0 - 0.5 | 09/17/03 | <10 | **9** | **89** | <1 | <1 | **25** | **9.2** | **23** | **12** | <0.2 | <5 | **17** | <1 | <1 | <10 | **47** | **70** |
| SS-136-B | 2 - 2.5 | 09/17/03 | <5 | **4.2** | **69** | **0.53** | <0.5 | **20** | **7.6** | **16** | **7.8** | <0.2 | <2.5 | **13** | <0.5 | <0.5 | <5 | **39** | **50** |
| SS-136-C | 4 - 4.5 | 09/17/03 | <5 | **5.5** | **77** | **0.54** | <0.5 | **22** | **7.1** | **20** | **12** | <0.2 | <2.5 | **14** | <0.5 | <0.5 | <5 | **40** | **54** |
| SS-136-D | 6 - 6.5 | 09/17/03 | <5 | **4.3** | **95** | **0.53** | <0.5 | **19** | **7.9** | **23** | **3.3** | <0.2 | <2.5 | **12** | <0.5 | <0.5 | <5 | **41** | **57** |
| COMPOSITE OF SS-64-A | 0 - 0.5 | 09/10/03 | <5 | **4.2** | **67** | **0.55** | <0.5 | **19** | **6.6** | **15** | **9.2** | <0.2 | <2.5 | **12** | <1 | <0.5 | <5 | **37** | **51** |
| COMPOSITE OF SS-64-B | 2 - 2.5 | 09/10/03 | <10 | **5** | **100** | <1 | <1 | **31** | **10** | **25** | **12** | <0.2 | <5 | **20** | <1 | <1 | <10 | **60** | **71** |
| COMPOSITE OF SS-64-C | 4 - 4.5 | 09/10/03 | <5 | **4.3** | **71** | **0.66** | <0.5 | **24** | **7.1** | **19** | **8.8** | <0.2 | <2.5 | **14** | <0.5 | <0.5 | <5 | **44** | **54** |
| COMPOSITE OF SS-64-D | 6 - 6.5 | 09/10/03 | <5 | **4** | **25** | <0.5 | <0.5 | **9.6** | **3.4** | **5.1** | <2.5 | <0.2 | <2.5 | **6.5** | <0.5 | <0.5 | <5 | **18** | **21** |

NOTES:

(1) USEPA Region 9 Preliminary Remediation Goal [EPA, 2002]

mg/kg - milligrams per kilogram

Detections are presented in **BOLD**.

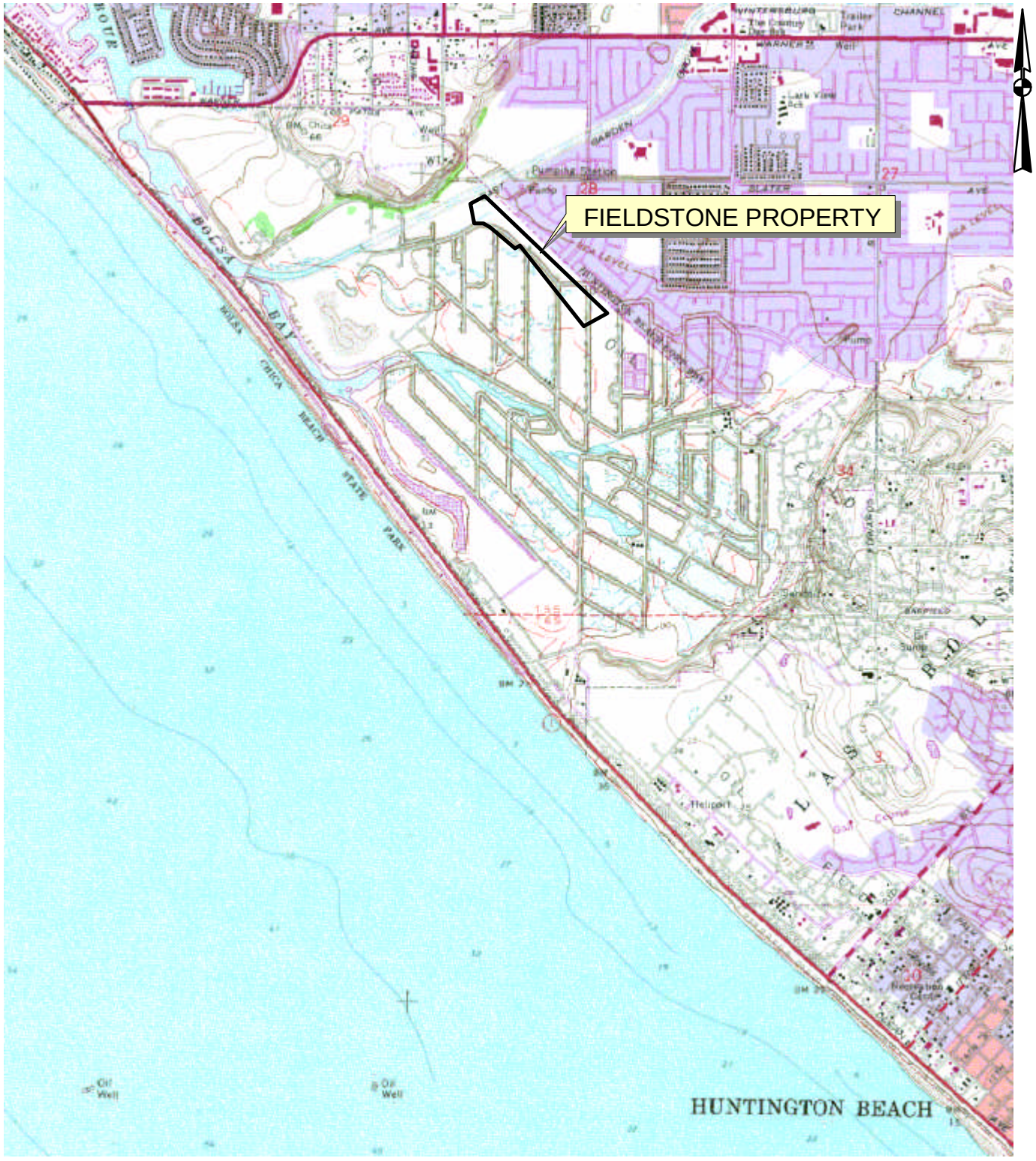
**TABLE 5-1**
**PCB-1260 PHYSICAL PROPERTIES**
**REMEDIAL INVESTIGATION REPORT**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**

| PHYSICAL PROPERTY | PCB-1260 | INTERPRETATION [Allen, 1999] |
|---|---|---|
| Physical State [Merck, 1996] | Light yellow, soft, sticky resin | PCB-1260 has low mobility in a soil matrix. |
| Average Molecular Weight [USDHHS, 1993] | 375.7 g/mole (average) | Molecules consist of a biphenyl and varying amounts of chlorine. |
| Density at 25 ˚C [Prager, 1996] | 1.58 g/ml | 1.58 times more dense than water under Site conditions. |
| Pour Point (1) [EPA, 1980] | 31 $^{o}$C | Suggests a relatively immobile compound at average Site conditions. |
| Boiling Point [USDHHS, 1993] | 385-420 $^{o}$C | Suggests a relatively immobile, non-volatile compound over a wide range of temperatures. |
| Flash Point [Prager, 1996] | >385 $^{o}$C | Suggests compound stability. |
| Vapor Pressure at 20˚C [Prager, 1996] | 0.0000405 mm Hg at 25 $^{o}$C | Relatively non-volatile compound. |
| Relative Evaporation Rate [EPA, 1987] | 0-0.1% at 100 $^{o}$C for 6 hours | Very low evaporation rate. |
| Water Solubility [Prager, 1996] | 0.000027 g/L | Below 0.0001 g/L classified insoluble. |
| Henry's Law Constant [Toxnet, 2003] | 1.8 x $10^{-5}$ to 7.4 x $10^{-5}$ atm-$m^3$/mole | Classified as slightly volatile. |
| log $K_{oc}$ [Sklarew, 1987] | 4.8 to 6.8 | High soil sorption suggests that PCB-1260 is relatively immobile in soil. |

Note:
(1) Pour point – PCB-1260 does not crystallize, but rather changes state to a resin at approximately the "pour point"
$K_{oc}$ – Soil Sorption Partition Coefficient

# FIGURES

# REMEDIAL INVESTIGATION REPORT
# FIELDSTONE PROPERTY
# ORANGE COUNTY, CALIFORNIA




GeoSyntec Consultants

SITE LOCATION
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 1-1 |
| PROJECT NO. | HR0653-01 |
| FILE NO. | 0653G001.APR |
| DATE: | JANUARY 2004 |

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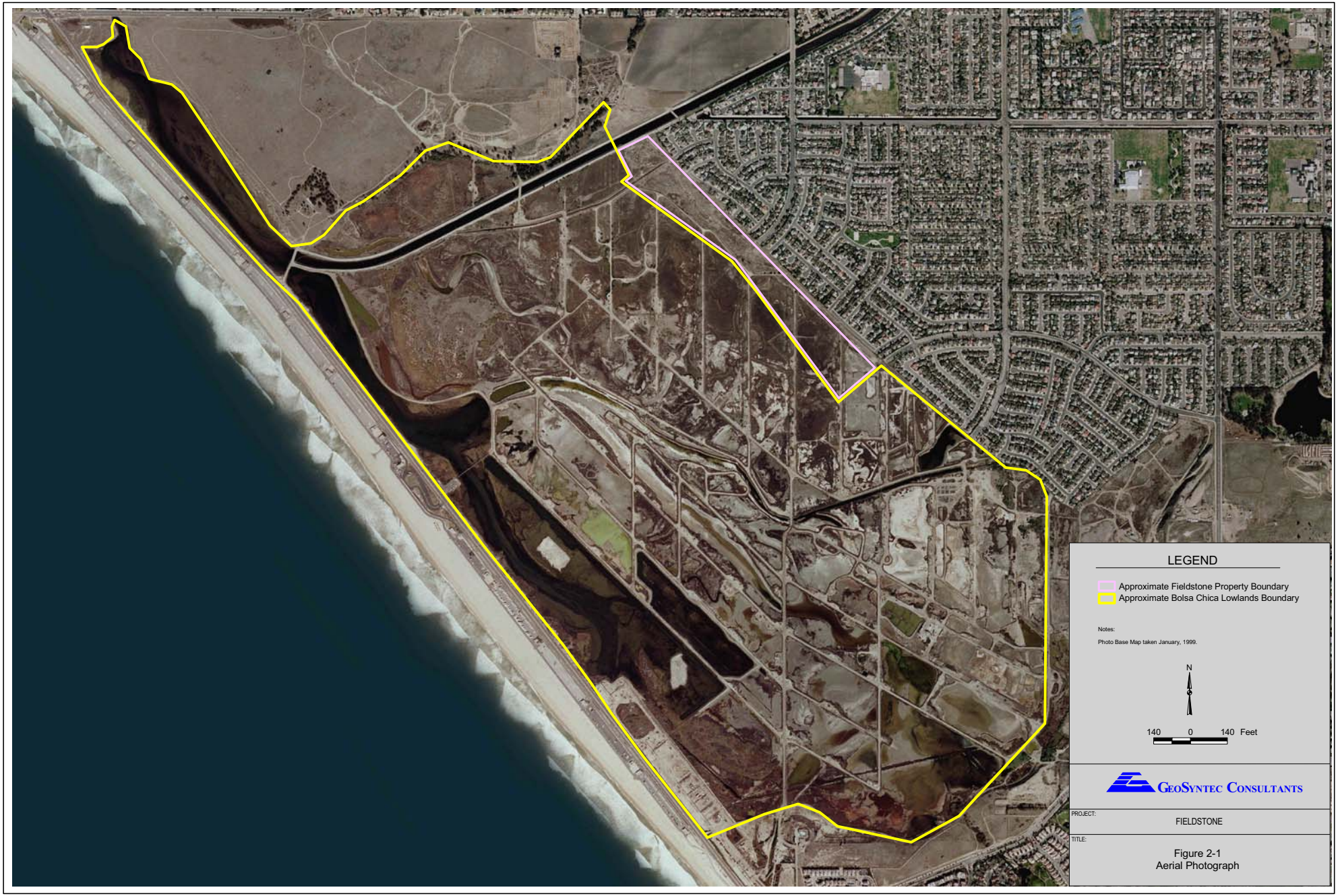

LEGEND
Approximate Fieldstone Property Boundary
Approximate Bolsa Chica Lowlands Boundary
Notes:
Photo Base Map taken January, 1999.
N
140 0 140 Feet
GeoSyntec Consultants
PROJECT:
FIELDSTONE
TITLE:
Figure 2-1
Aerial Photograph

# FIGURE 2-2

WINTERSBURG CHANNEL

**Discrete Samples**
**R50C2-1 (0 to 0.5 ft bgs)**
**R50C2-2 (2.5 to 6 ft bgs)**

RD-50-4
RD-47-01
RD-47-02
CAR26-2
CAR26-1
RD-47-03(F03)
P-9
RD-47-04(F04)
RD-42-01
RD-41-01
RD-42-02
RD-41-03
RD-41-02

**Composite Samples**
**R47C1-1 (0 to 0.5 ft bgs)**
**R47C1-2 (2.5 to 6 ft bgs)**

**Composite Samples**
**R42C1-1 (0 to 0.5 ft bgs)**
**R42C1-2 (2.5 to 6 ft bgs)**

**Composite Samples**
**R41C1-1 (0 to 0.5 ft bgs)**
**R41C1-2 (2.5 to 6 ft bgs)**

SS-49
MW-1
MW-2
MW-3
85-1
65A
74
75

50
66
48
47
46
45
42
41
40

FRANKTON DR
GRAHAM ST
FALKIRK LN
BIRKSHIRE DR
TALBERT AVE

## Legend

- Groundwater Well
- CH2M Hill Focused Sample Location
- Oil Well - Abandoned Prior to 1986
- Tetra Tech Sample
- CH2M Hill Random Sampling Locations
- Stormwater Controls
- Soil Berm
- Approximate Fence Line
- Newport-Inglewood Fault Trace (approximate Location) Woodward-Clyde Consultants, 1991
- Oil Field Cell Boundary
- Approximate Location of the Majority of the Debris Piles
- Approximate Seasonal Ponds
- Fieldstone Property Boundary
- Site 26 (Identified by Schaefer-Dixon, 1991 Phase 1 ESA)

Notes:
1. Locations are based on information provided by third parties and are approximate.
2. References for Topographic map:
[illegible]
Original Topography Compiled By Williamson and Schmid from 100 Scale Aerial Photography By Sun-World Surveys, On 17 September 1980 and 28 July 1980.
3. References for Streets:
Adapted from United States Geological Survey 7.5 Minute Seal Beach, California Quadrangle, 1965 Edition.
Survey Coordinates are Referenced to North American Datum (NAD) of 1927 and National Geodetic Vertical Datum (NGVD) of 1929 Mean Sea Level.

N

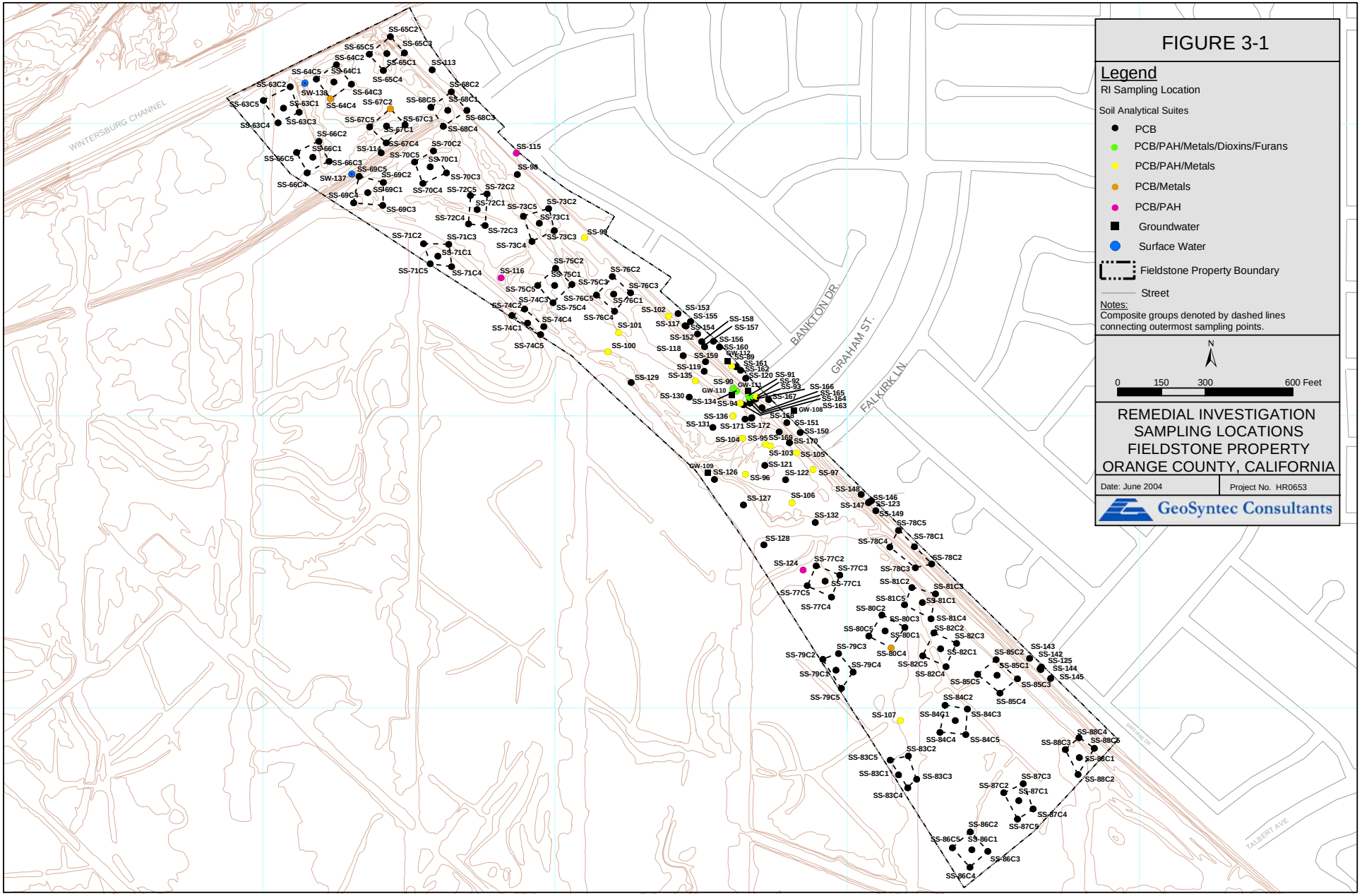
0 150 300 600 Feet

PREVIOUS SAMPLING LOCATIONS/SITE FEATURES (BOLSA CHICA ECOLOGICAL RISK ASSESSMENT [CH2MHILL, 2001])

Date: January 2004 | Project No. HR0653

GeoSyntec Consultants

M:\GIS\HR0653\PROJECTS\D_20040609\previous_samp_loca.mxd jld 061004




# FIGURE 3-1

## Legend

RI Sampling Location

Soil Analytical Suites

- PCB
- PCB/PAH/Metals/Dioxins/Furans
- PCB/PAH/Metals
- PCB/Metals
- PCB/PAH
- Groundwater
- Surface Water

Fieldstone Property Boundary

Street

Notes:
Composite groups denoted by dashed lines connecting outermost sampling points.

N

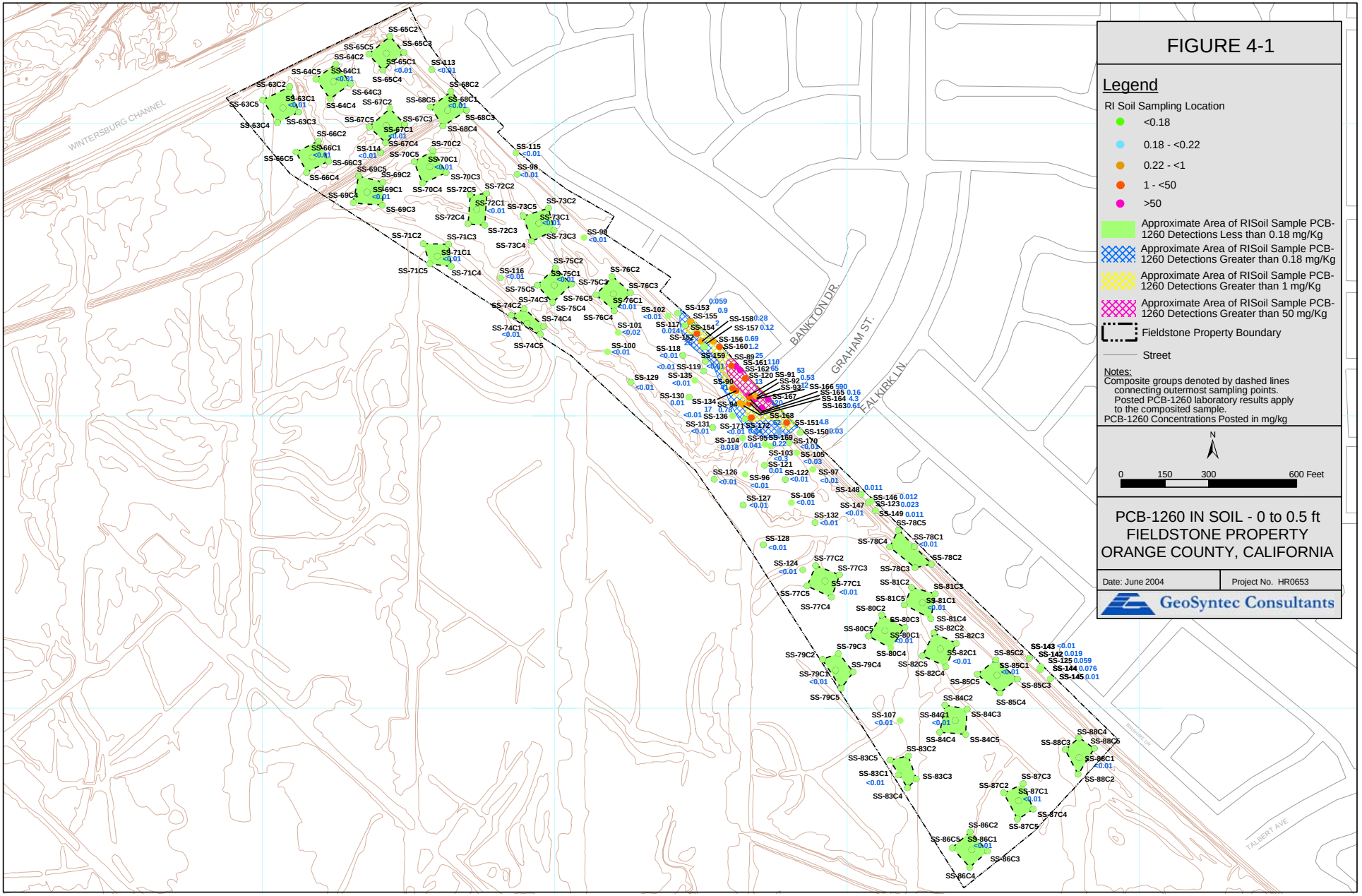
0 150 300 600 Feet

REMEDIAL INVESTIGATION
SAMPLING LOCATIONS
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA

Date: June 2004 | Project No. HR0653

GeoSyntec Consultants

M:\GIS\HR0653\Projects\D_20040609\PCB_1260_D.mxd GWW 060704




# FIGURE 4-1

## Legend

RI Soil Sampling Location

- <0.18
- 0.18 - <0.22
- 0.22 - <1
- 1 - <50
- >50

Approximate Area of RISoil Sample PCB-1260 Detections Less than 0.18 mg/Kg

Approximate Area of RISoil Sample PCB-1260 Detections Greater than 0.18 mg/Kg

Approximate Area of RISoil Sample PCB-1260 Detections Greater than 1 mg/Kg

Approximate Area of RISoil Sample PCB-1260 Detections Greater than 50 mg/Kg

Fieldstone Property Boundary

Street

Notes:
Composite groups denoted by dashed lines connecting outermost sampling points.
Posted PCB-1260 laboratory results apply to the composited sample.
PCB-1260 Concentrations Posted in mg/kg

N

0 150 300 600 Feet

# PCB-1260 IN SOIL - 0 to 0.5 ft FIELDSTONE PROPERTY ORANGE COUNTY, CALIFORNIA

Date: June 2004

Project No. HR0653

GeoSyntec Consultants

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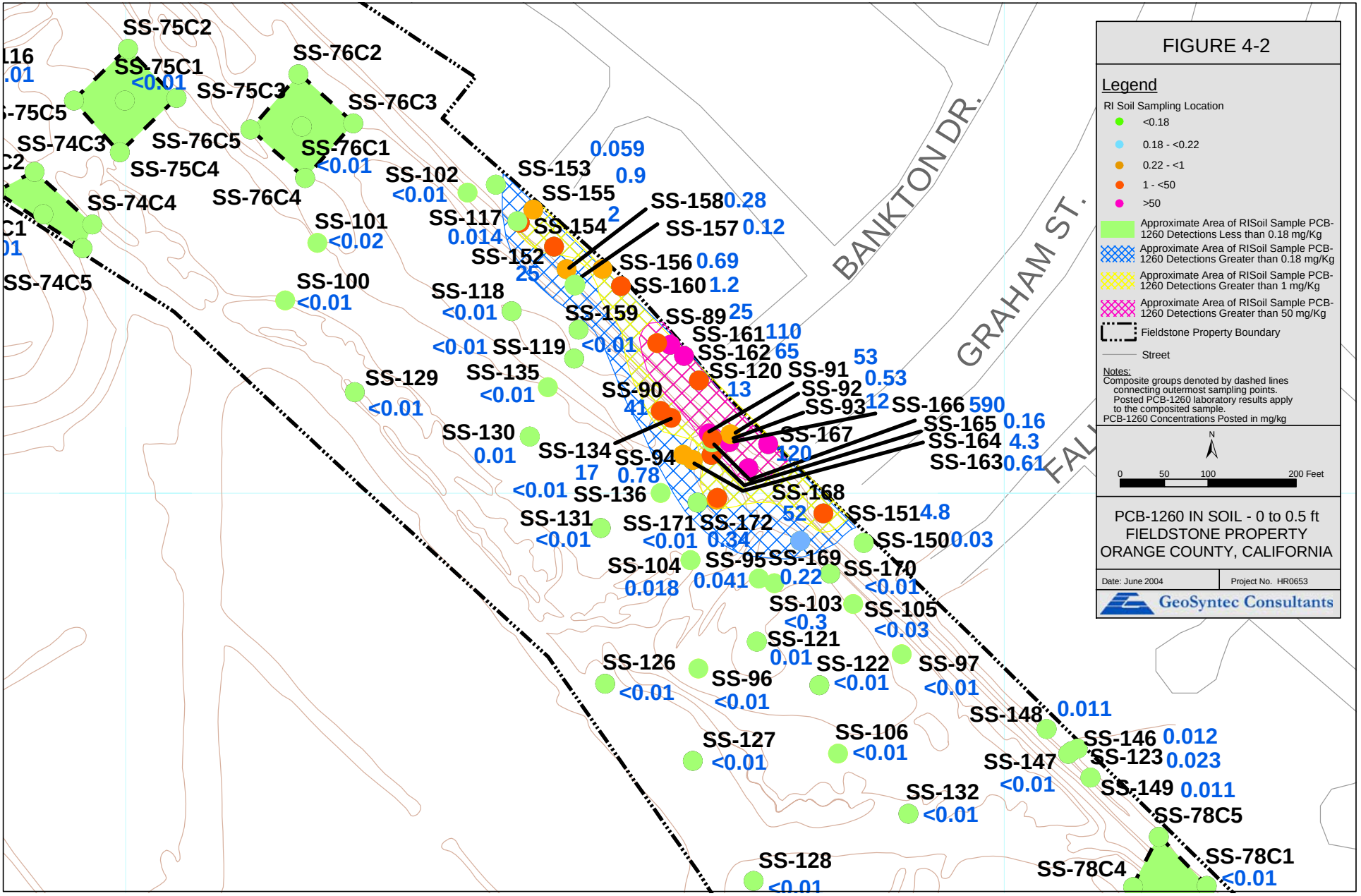
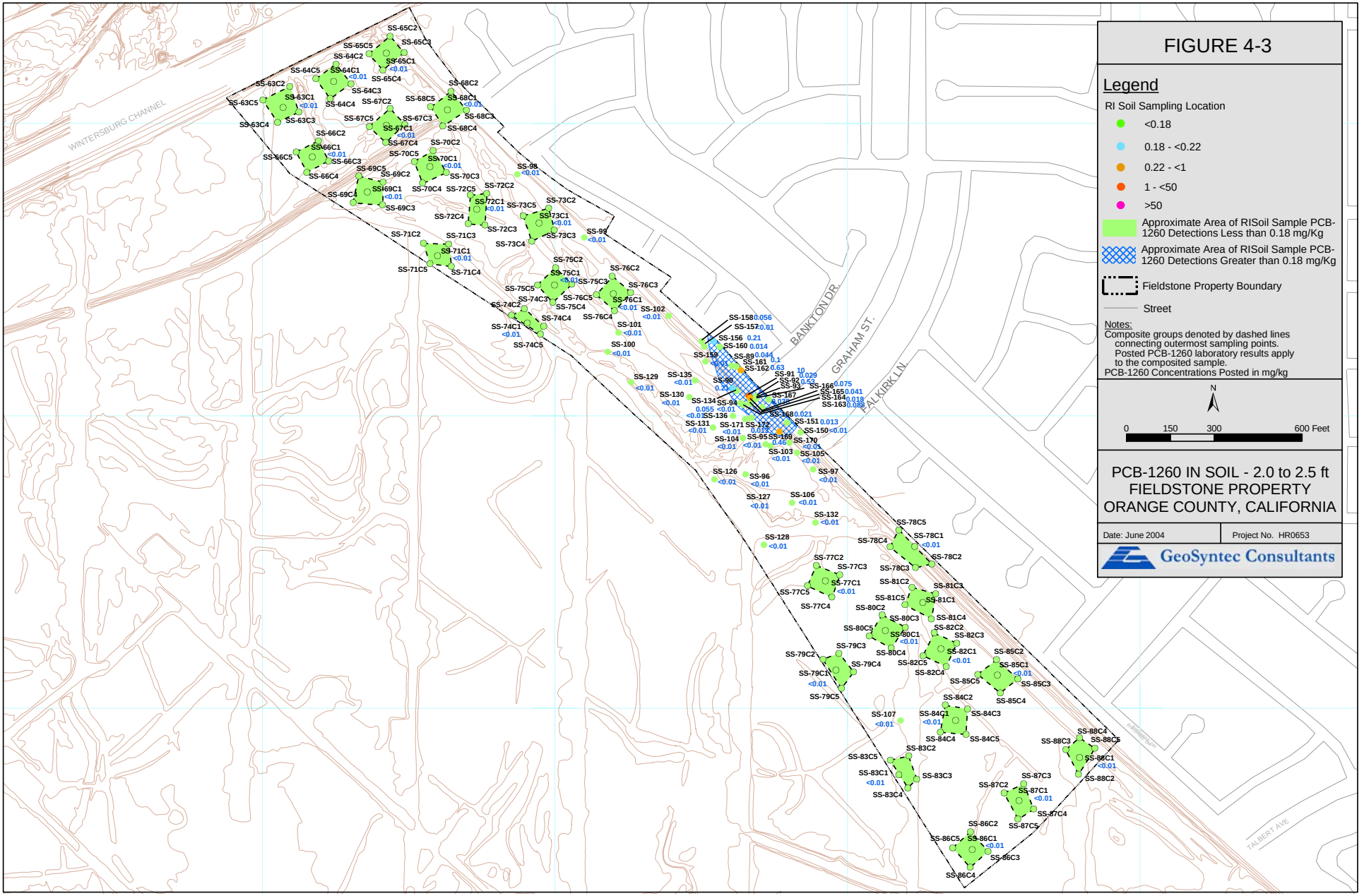


FIGURE 4-2
Legend
RI Soil Sampling Location
<0.18
0.18 - <0.22
0.22 - <1
1 - <50
>50
Approximate Area of RISoil Sample PCB-1260 Detections Less than 0.18 mg/Kg
Approximate Area of RISoil Sample PCB-1260 Detections Greater than 0.18 mg/Kg
Approximate Area of RISoil Sample PCB-1260 Detections Greater than 1 mg/Kg
Approximate Area of RISoil Sample PCB-1260 Detections Greater than 50 mg/Kg
Fieldstone Property Boundary
Street
Notes:
Composite groups denoted by dashed lines connecting outermost sampling points.
Posted PCB-1260 laboratory results apply to the composited sample.
PCB-1260 Concentrations Posted in mg/kg
N
0 50 100 200 Feet
PCB-1260 IN SOIL - 0 to 0.5 ft
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA
Date: June 2004
Project No. HR0653
GeoSyntec Consultants
BANKTON DR.
GRAHAM ST.
SS-75C2
SS-75C1 <0.01
SS-75C3
SS-75C5
SS-74C3
SS-75C4
SS-74C4
SS-74C5
SS-76C2
SS-76C3
SS-76C5
SS-76C1 <0.01
SS-76C4
SS-102 <0.01
SS-101 <0.02
SS-100 <0.01
SS-153 0.059
SS-155 0.9
SS-158 0.28
SS-117 0.014
SS-154 2
SS-157 0.12
SS-152 25
SS-156 0.69
SS-160 1.2
SS-118 <0.01
SS-159
SS-89 25
SS-161 110
<0.01 SS-119 <0.01
SS-162 65
SS-120 53
SS-91 0.53
SS-129 <0.01
SS-135 <0.01
SS-90 41
SS-92 13
SS-93 12
SS-166 590
SS-165 0.16
SS-130 0.01
SS-167
SS-164 4.3
SS-134
SS-94 120
SS-163 0.61
17 0.78
<0.01 SS-136
SS-168
SS-131 <0.01
SS-171 <0.01
SS-172 0.34
52
SS-151 4.8
SS-150 0.03
SS-104 0.018
SS-95 0.041
SS-169 0.22
SS-170 <0.01
SS-103 <0.3
SS-105 <0.03
SS-121 0.01
SS-126 <0.01
SS-96 <0.01
SS-122 <0.01
SS-97 <0.01
SS-148 0.011
SS-127 <0.01
SS-106 <0.01
SS-146 0.012
SS-123 0.023
SS-147 <0.01
SS-149 0.011
SS-132 <0.01
SS-78C5
SS-78C1 <0.01
SS-78C4
SS-128 <0.01

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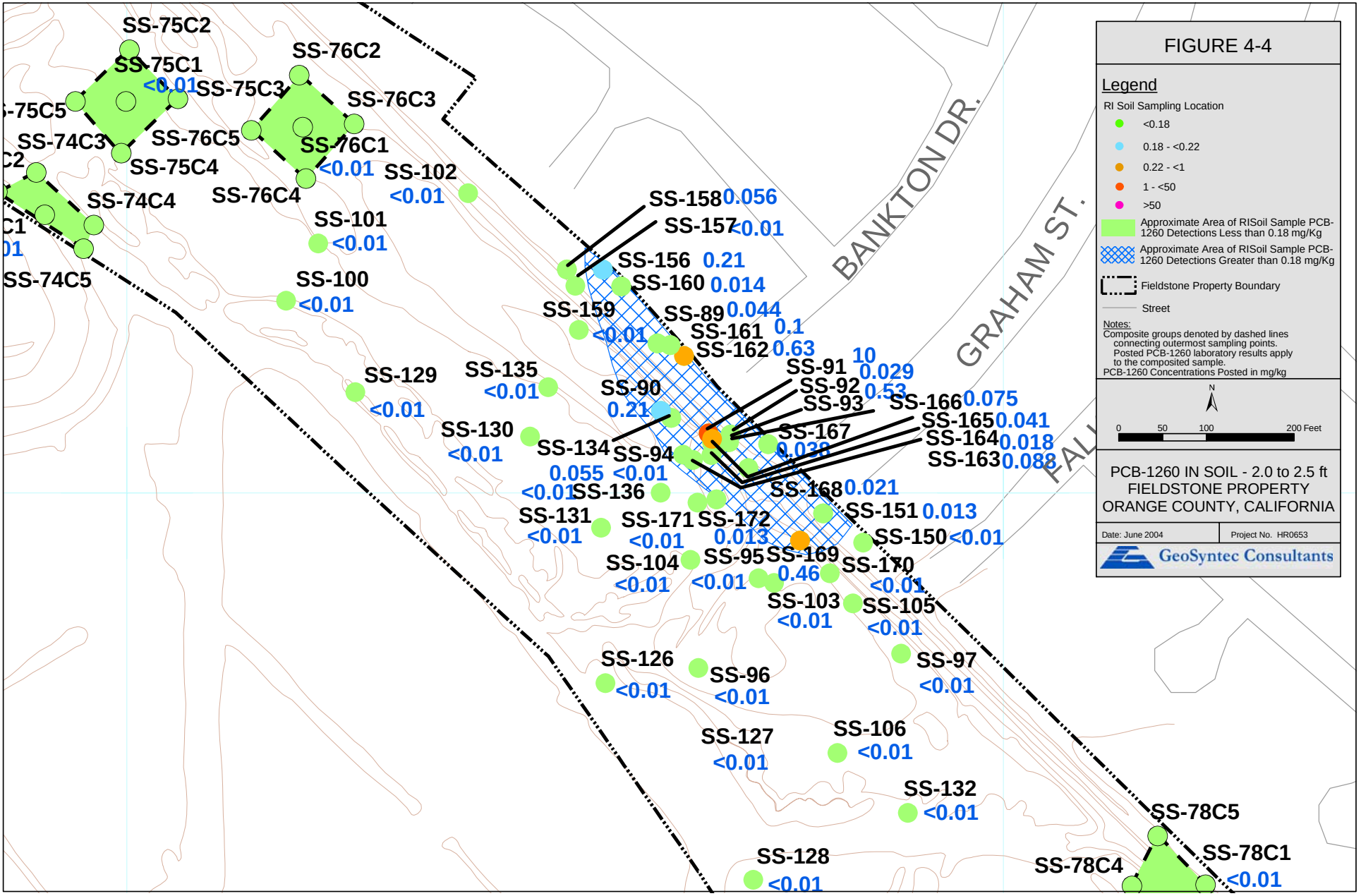
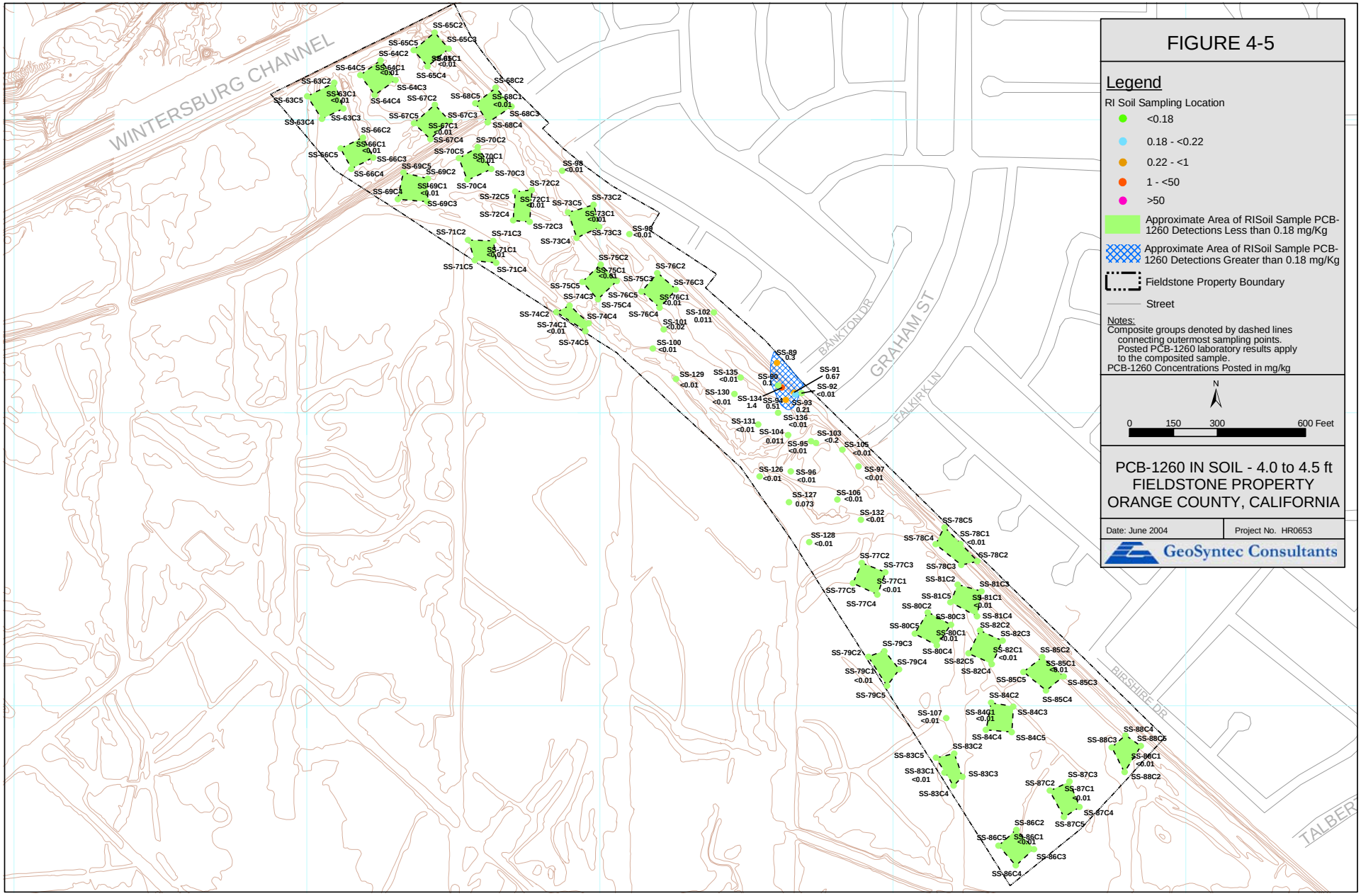

SS-75C2
SS-75C1
<0.01
SS-75C3
SS-75C5
SS-74C3
SS-75C4
SS-74C4
SS-74C5
SS-76C2
SS-76C3
SS-76C1
<0.01
SS-76C5
SS-76C4
SS-102
<0.01
SS-101
<0.01
SS-100
<0.01
SS-129
<0.01
SS-135
<0.01
SS-130
<0.01
SS-134
0.055
SS-136
<0.01
SS-131
<0.01
SS-158 0.056
SS-157 <0.01
SS-156 0.21
SS-160 0.014
SS-159
<0.01
SS-89 0.044
SS-161 0.1
SS-162 0.63
SS-90
0.21
SS-94
<0.01
SS-91 10
SS-92 0.029
SS-93 0.53
SS-166 0.075
SS-165 0.041
SS-164 0.018
SS-163 0.088
SS-167
0.038
SS-168 0.021
SS-151 0.013
SS-150 <0.01
SS-171
<0.01
SS-172
0.013
SS-104
<0.01
SS-95
<0.01
SS-169
0.46
SS-170
<0.01
SS-103
<0.01
SS-105
<0.01
SS-97
<0.01
SS-126
<0.01
SS-96
<0.01
SS-127
<0.01
SS-106
<0.01
SS-132
<0.01
SS-128
<0.01
SS-78C5
SS-78C4
SS-78C1
<0.01
BANKTON DR.
GRAHAM ST.
FALL
FIGURE 4-4
Legend
RI Soil Sampling Location
<0.18
0.18 - <0.22
0.22 - <1
1 - <50
>50
Approximate Area of RISoil Sample PCB-1260 Detections Less than 0.18 mg/Kg
Approximate Area of RISoil Sample PCB-1260 Detections Greater than 0.18 mg/Kg
Fieldstone Property Boundary
Street
Notes:
Composite groups denoted by dashed lines connecting outermost sampling points.
Posted PCB-1260 laboratory results apply to the composited sample.
PCB-1260 Concentrations Posted in mg/kg
N
0
50
100
200 Feet
PCB-1260 IN SOIL - 2.0 to 2.5 ft
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA
Date: June 2004
Project No. HR0653
GeoSyntec Consultants
M:\GIS\HR0653\Projects\D_20040609\PCB_1260_F.mxd GWW 060704




# FIGURE 4-5

## Legend

RI Soil Sampling Location

- <0.18
- 0.18 - <0.22
- 0.22 - <1
- 1 - <50
- >50

Approximate Area of RISoil Sample PCB-1260 Detections Less than 0.18 mg/Kg

Approximate Area of RISoil Sample PCB-1260 Detections Greater than 0.18 mg/Kg

Fieldstone Property Boundary

Street

Notes:
Composite groups denoted by dashed lines connecting outermost sampling points.
Posted PCB-1260 laboratory results apply to the composited sample.
PCB-1260 Concentrations Posted in mg/kg

N

0 150 300 600 Feet

## PCB-1260 IN SOIL - 4.0 to 4.5 ft
## FIELDSTONE PROPERTY
## ORANGE COUNTY, CALIFORNIA

Date: June 2004 | Project No. HR0653

GeoSyntec Consultants

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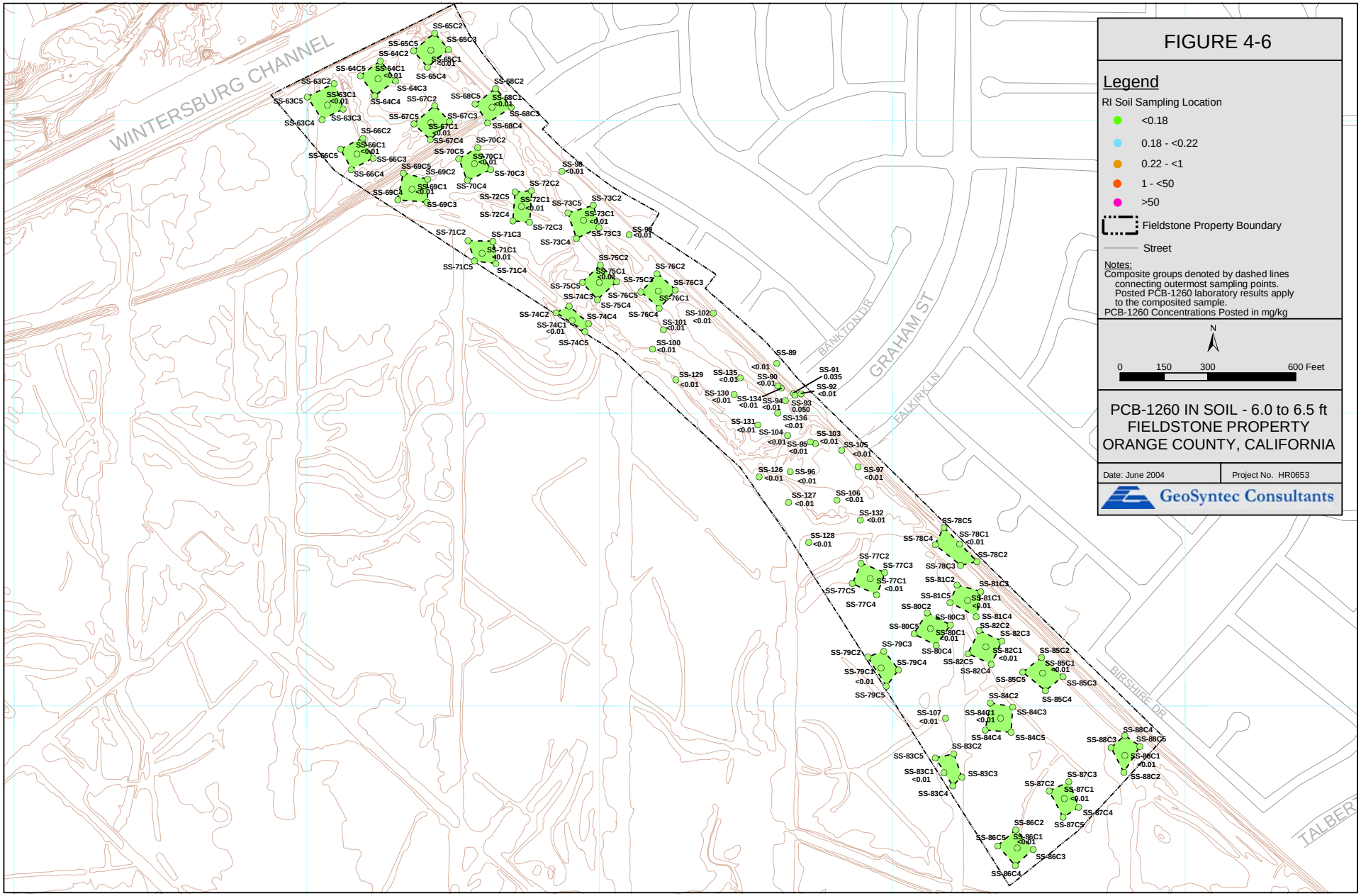
WINTERSBURG CHANNEL
BANKTOND R
GRAHAM ST
FALKIRK LN
BIRKSHIRE DR
TALBER
SS-65C2
SS-65C3
SS-65C5
SS-64C2
SS-65C1 <0.01
SS-64C5
SS-64C1 <0.01
SS-65C4
SS-63C2
SS-64C3
SS-68C2
SS-63C5
SS-63C1 <0.01
SS-64C4
SS-67C2
SS-68C5
SS-68C1 <0.01
SS-63C4
SS-63C3
SS-67C5
SS-67C3
SS-68C3
SS-67C1 <0.01
SS-68C4
SS-66C2
SS-67C4
SS-70C2
SS-66C5
SS-66C1 <0.01
SS-70C5
SS-66C3
SS-70C1 <0.01
SS-66C4
SS-69C5
SS-69C2
SS-70C3
SS-98 <0.01
SS-69C4
SS-69C1 <0.01
SS-70C4
SS-72C2
SS-72C5
SS-72C1 <0.01
SS-73C5
SS-73C2
SS-69C3
SS-72C4
SS-73C1 <0.01
SS-72C3
SS-99 <0.01
SS-71C2
SS-73C3
SS-71C3
SS-73C4
SS-71C1 <0.01
SS-71C5
SS-71C4
SS-75C2
SS-76C2
SS-75C1 <0.01
SS-75C5
SS-75C3
SS-76C3
SS-74C3
SS-76C5
SS-76C1
SS-75C4
SS-74C2
SS-74C4
SS-76C4
SS-102 <0.01
SS-74C1 <0.01
SS-101 <0.01
SS-74C5
SS-100 <0.01
SS-89
<0.01
SS-91 0.035
SS-129 <0.01
SS-135 <0.01
SS-90 <0.01
SS-92 <0.01
SS-130 <0.01
SS-134 <0.01
SS-94 <0.01
SS-93 0.050
SS-136 <0.01
SS-131 <0.01
SS-104 <0.01
SS-103 <0.01
SS-95 <0.01
SS-105 <0.01
SS-126 <0.01
SS-96 <0.01
SS-97 <0.01
SS-127 <0.01
SS-106 <0.01
SS-132 <0.01
SS-128 <0.01
SS-78C5
SS-78C1 <0.01
SS-78C4
SS-78C2
SS-77C2
SS-78C3
SS-77C3
SS-77C1 <0.01
SS-81C2
SS-81C3
SS-77C5
SS-81C5
SS-81C1 <0.01
SS-77C4
SS-80C2
SS-80C3
SS-81C4
SS-80C5
SS-82C2
SS-80C1 <0.01
SS-82C3
SS-79C3
SS-80C4
SS-82C1 <0.01
SS-85C2
SS-79C2
SS-82C5
SS-95C1 <0.01
SS-79C4
SS-82C4
SS-85C5
SS-85C3
SS-79C1 <0.01
SS-85C4
SS-79C5
SS-84C2
SS-107 <0.01
SS-84C1 <0.01
SS-84C3
SS-84C4
SS-84C5
SS-88C4
SS-83C2
SS-88C3
SS-88C5
SS-83C5
SS-86C1 <0.01
SS-83C1 <0.01
SS-83C3
SS-88C2
SS-83C4
SS-87C2
SS-87C3
SS-87C1 <0.01
SS-87C4
SS-87C5
SS-86C2
SS-86C5
SS-86C1 <0.01
SS-86C3
SS-86C4
FIGURE 4-6
Legend
RI Soil Sampling Location
<0.18
0.18 - <0.22
0.22 - <1
1 - <50
>50
Fieldstone Property Boundary
Street
Notes:
Composite groups denoted by dashed lines connecting outermost sampling points.
Posted PCB-1260 laboratory results apply to the composited sample.
PCB-1260 Concentrations Posted in mg/kg
N
0
150
300
600 Feet
PCB-1260 IN SOIL - 6.0 to 6.5 ft
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA
Date: June 2004
Project No. HR0653
GeoSyntec Consultants
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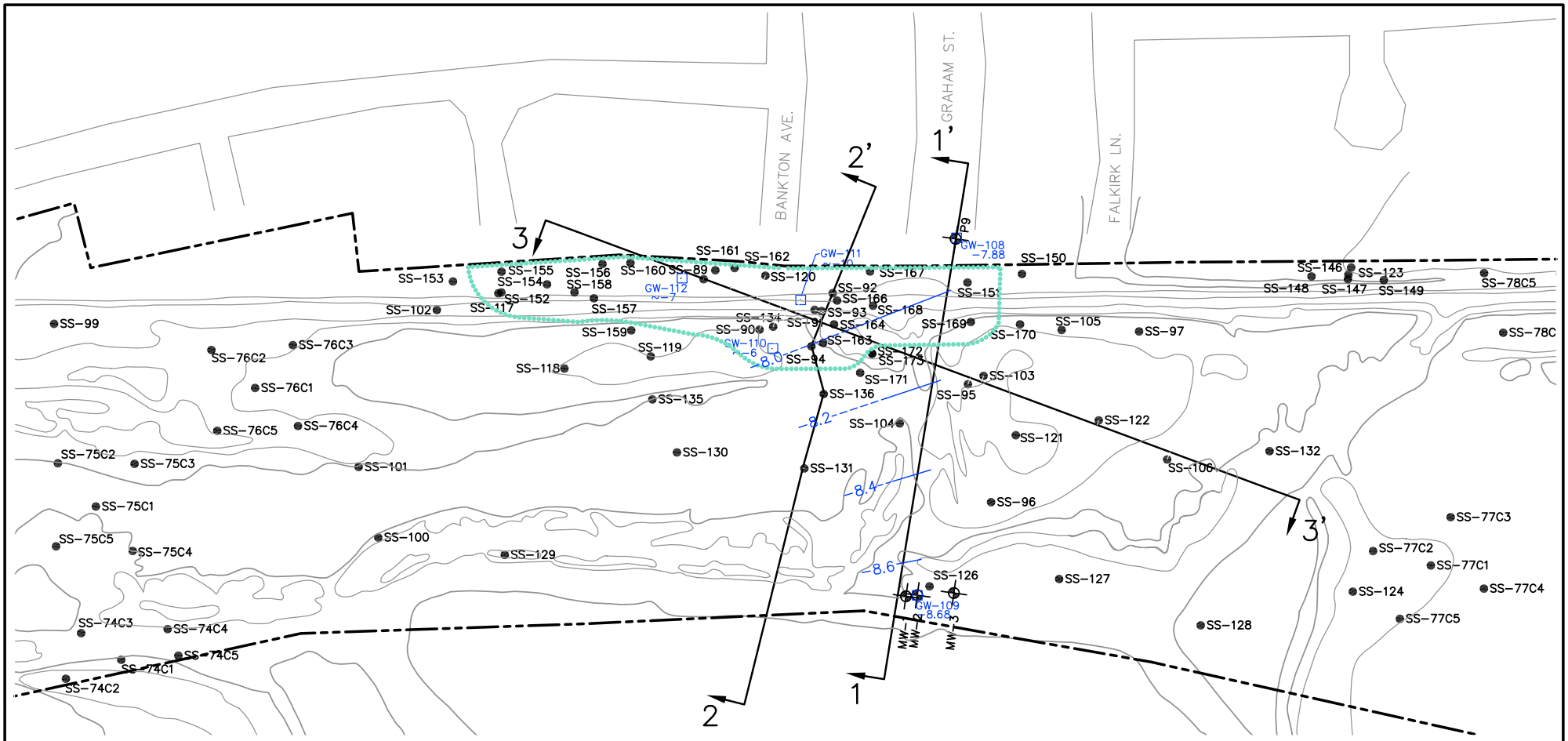



## LEGEND

- FIELDSTONE PROPERTY BOUNDARY
- APPROXIMATE BOUNDARY OF PCB >0.18 mg/kg (RI SAMPLES 2003)
- SS-100 — RI SOIL SAMPLING LOCATION
- GW-108 −7.88 — RI GROUNDWATER SAMPLING LOCATION; APPROXIMATE GROUNDWATER ELEVATION (OCTOBER 2003)
- P9 — GROUNDWATER WELL OR PIEZOMETER LOCATION
- GROUNDWATER POTENTIOMETRIC LINE (DASHED WHERE APPROXIMATE)

N

0 50 100 SCALE IN FEET

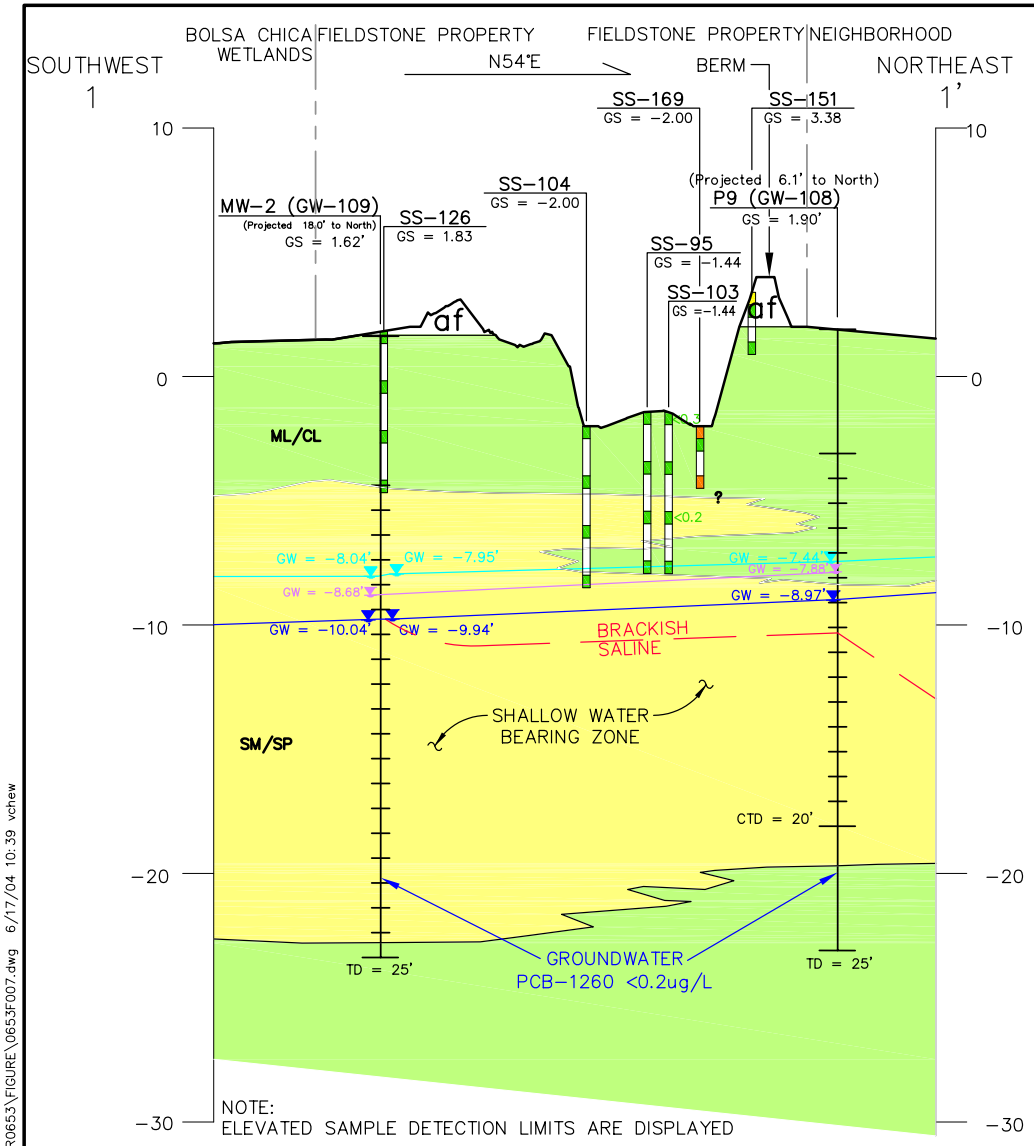
NOTE: GW-110, GW-111, GW-112 WERE TEMPORARY GROUNDWATER SAMPLING LOCATIONS. REFERENCE ELEVATIONS ARE APPROXIMATED BASED ON TOPOGRAPHY THEREFORE GROUNDWATER ELEVATIONS ARE APPROXIMATE. GROUNDWATER FLOW DIRECTION, BASED ON THE SURVEYED PERMANENT MONITORING WELLS MW-2 AND P-9, IS CONSISTENT WITH PREVIOUS RESULTS DOCUMENTED IN 1999-2000.

GeoSyntec Consultants

RI SAMPLE AND CROSS SECTION LOCATIONS
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 4-7 |
| PROJECT NO. | HR0653-01 |
| DOCUMENT NO. | FLD03-38 |
| DATE: | JANUARY 2004 |

N:\CACADD\HR0653\FIGURE\0653F010.dwg 6/17/04 13:39 vchew

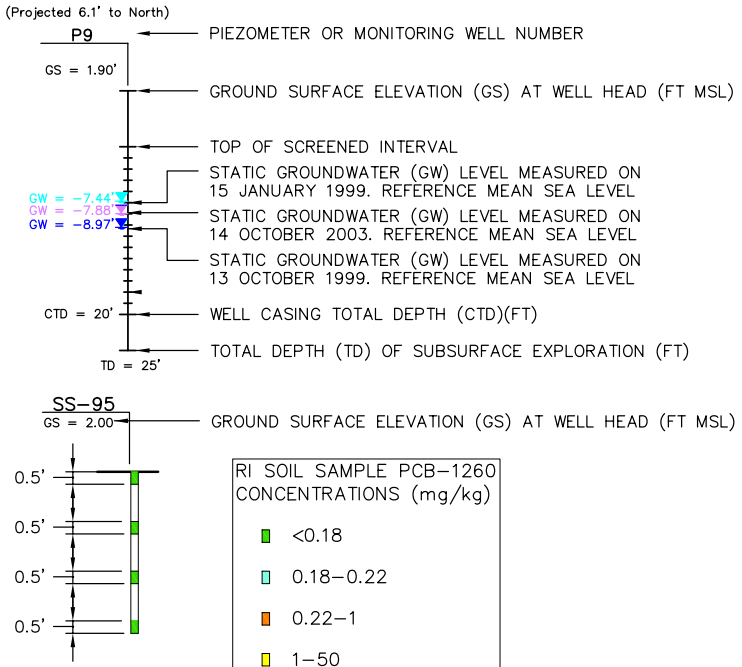



NOTE:
ELEVATED SAMPLE DETECTION LIMITS ARE DISPLAYED

HYDROGEOLOGIC INFORMATION EXCERPTED FROM "HYDROGEOLOGIC EVALUATION OF SHALLOW GROUNDWATER CONDITIONS AND ASSOCIATED IMPACTED OF WETLAND RESTORATION, BOLSA CHICA WETLAND", GEOSYNTEC CONSULTANTS, 2000.

## LEGEND

- APPROXIMATE LITHOLOGIC CONTACT, QUERIED WHERE UNCERTAIN
- af — ARTIFICIAL FILL
- PREDOMINANTLY SILTS AND CLAYS
- PREDOMINANTLY SILTY SANDS AND SANDS




- P9 — PIEZOMETER OR MONITORING WELL NUMBER
- GS = 1.90' — GROUND SURFACE ELEVATION (GS) AT WELL HEAD (FT MSL)
- TOP OF SCREENED INTERVAL
- GW = -7.44', GW = -7.88' — STATIC GROUNDWATER (GW) LEVEL MEASURED ON 15 JANUARY 1999. REFERENCE MEAN SEA LEVEL
- GW = -8.97' — STATIC GROUNDWATER (GW) LEVEL MEASURED ON 14 OCTOBER 2003. REFERENCE MEAN SEA LEVEL
- STATIC GROUNDWATER (GW) LEVEL MEASURED ON 13 OCTOBER 1999. REFERENCE MEAN SEA LEVEL
- CTD = 20' — WELL CASING TOTAL DEPTH (CTD)(FT)
- TD = 25' — TOTAL DEPTH (TD) OF SUBSURFACE EXPLORATION (FT)
- SS-95, GS = 2.00 — GROUND SURFACE ELEVATION (GS) AT WELL HEAD (FT MSL)

RI SOIL SAMPLE PCB-1260 CONCENTRATIONS (mg/kg)

- <0.18
- 0.18-0.22
- 0.22-1
- 1-50
- >50

VERTICAL SCALE IN FEET
0 2.5 5

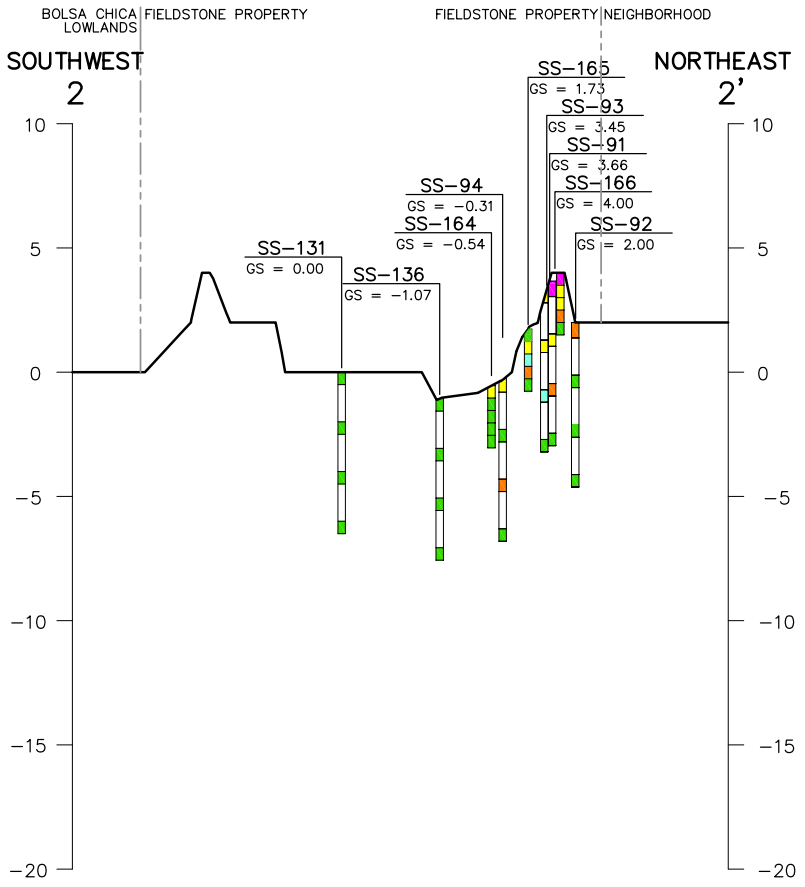
0 50 100
HORIZONTAL SCALE IN FEET

GeoSyntec Consultants

CROSS SECTION 1-1'
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA

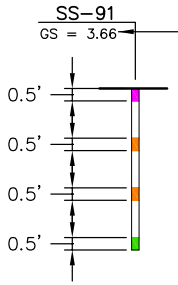
| | |
|---|---|
| FIGURE NO. | 4-8 |
| PROJECT NO. | HR0653-01 |
| DOCUMENT NO. | |
| DATE: | JANUARY 2004 |

N: \CAD\HR0653\FIGURE\0653F007.dwg 6/17/04 10:39 vchew




NOTE:
TOPOGRAPHICAL INFORMATION EXCERPTED FROM "HYDROGEOLOGIC EVALUATION OF SHALLOW GROUNDWATER CONDITIONS AND ASSOCIATED IMPACTED OF WETLAND RESTORATION, BOLSA CHICA WETLAND", GEOSYNTEC CONSULTANTS, 2000.

## LEGEND




GROUND SURFACE ELEVATION (GS) AT WELL HEAD (FT MSL)

RI SOIL SAMPLE PCB-1260 CONCENTRATIONS (mg/kg)

- <0.18
- 0.18-0.22
- 0.22-1
- 1-50
- >50

VERTICAL SCALE IN FEET
0 2.5 5

0 50 100
HORIZONTAL SCALE IN FEET

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CROSS SECTION 2-2'
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 4-9 |
| PROJECT NO. | HR0653-01 |
| DOCUMENT NO. | |
| DATE: | JANUARY 2004 |

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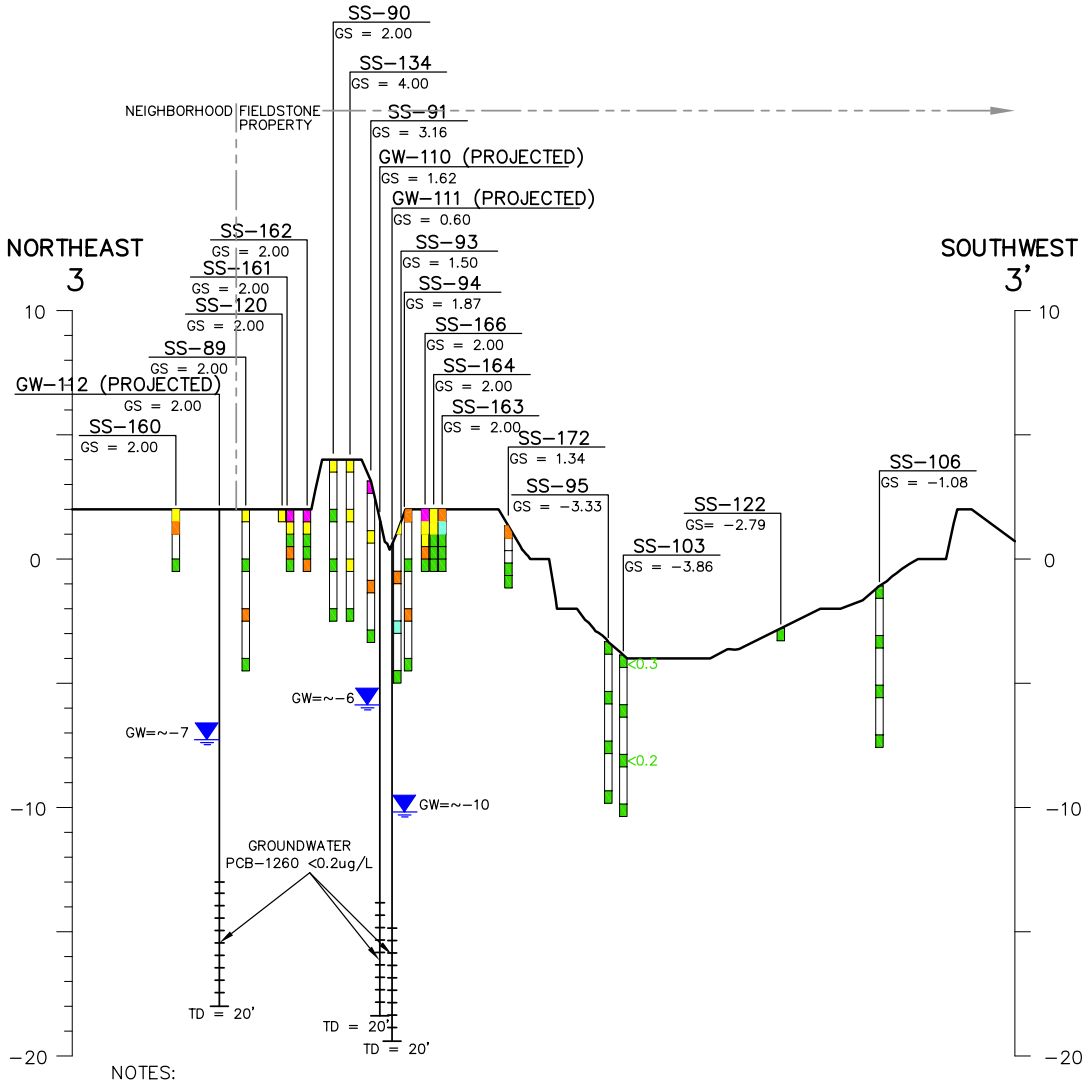
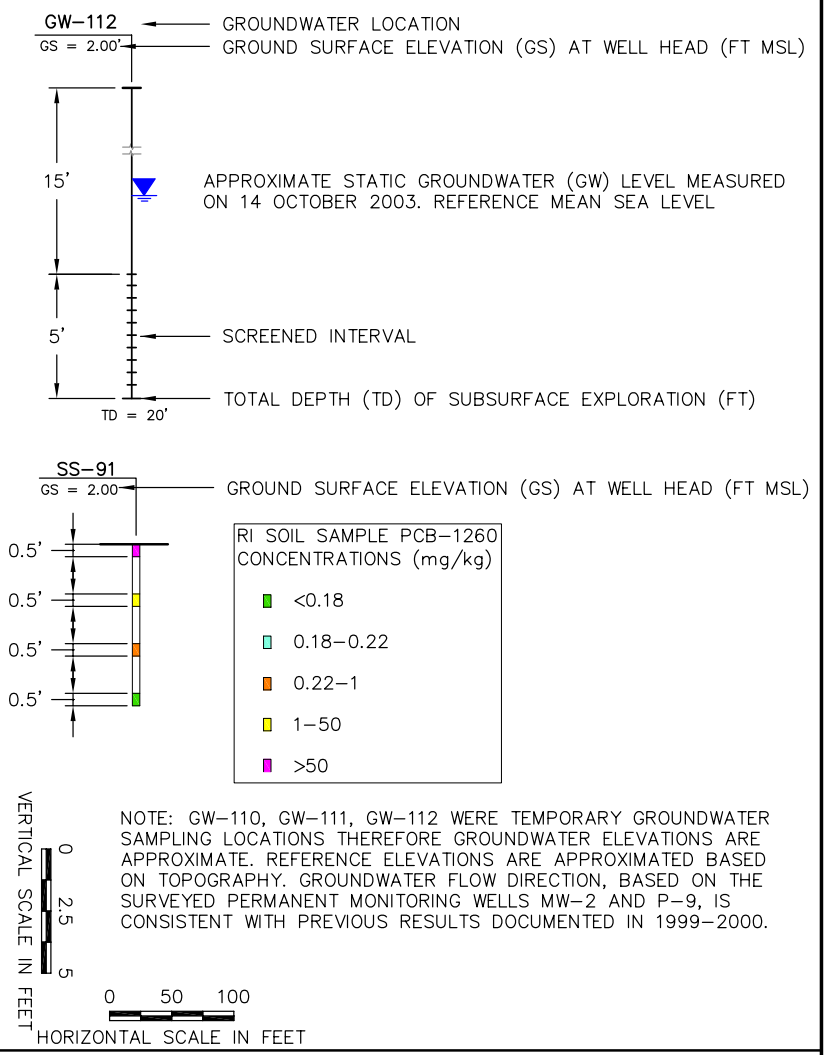



NOTES:
ELEVATED SAMPLE DETECTION LIMITS ARE DISPLAYED

TOPOGRAPHICAL INFORMATION EXCERPTED FROM "HYDROGEOLOGIC EVALUATION OF SHALLOW GROUNDWATER CONDITIONS AND ASSOCIATED IMPACTED OF WETLAND RESTORATION, BOLSA CHICA WETLAND", GEOSYNTEC CONSULTANTS, 2000.

## LEGEND




NOTE: GW-110, GW-111, GW-112 WERE TEMPORARY GROUNDWATER SAMPLING LOCATIONS THEREFORE GROUNDWATER ELEVATIONS ARE APPROXIMATE. REFERENCE ELEVATIONS ARE APPROXIMATED BASED ON TOPOGRAPHY. GROUNDWATER FLOW DIRECTION, BASED ON THE SURVEYED PERMANENT MONITORING WELLS MW-2 AND P-9, IS CONSISTENT WITH PREVIOUS RESULTS DOCUMENTED IN 1999-2000.

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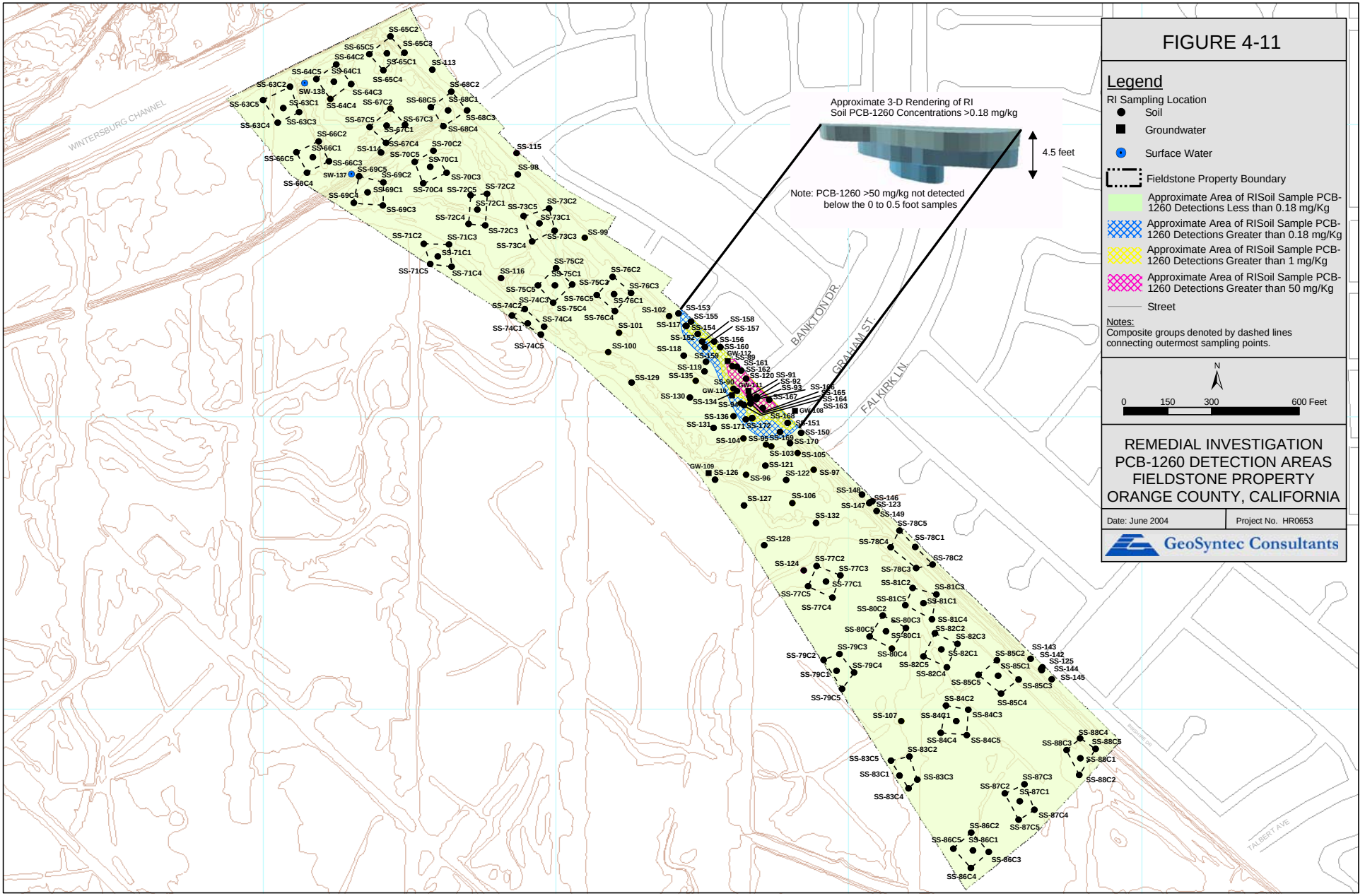
CROSS SECTION 3-3'
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA

| | |
|---|---|
| FIGURE NO. | 4-10 |
| PROJECT NO. | HR0653-01 |
| DOCUMENT NO. | |
| DATE: | JANUARY 2004 |

N: \CACADD\HR0653\FIGURE\0653F009.dwg 6/17/04 13:40 vchew

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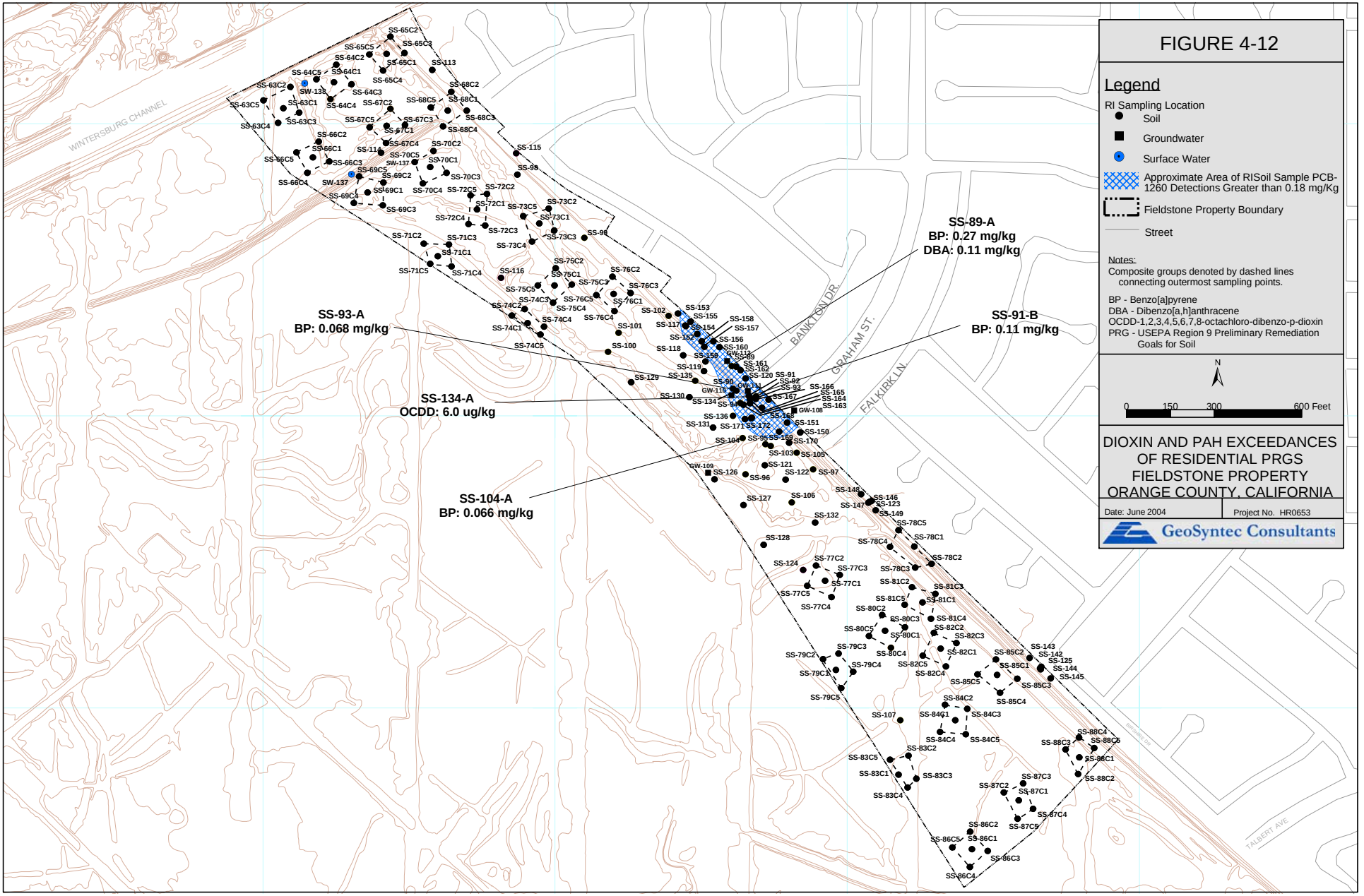


# FIGURE 4-12

## Legend

RI Sampling Location
- Soil
- Groundwater
- Surface Water

Approximate Area of RISoil Sample PCB-1260 Detections Greater than 0.18 mg/Kg

Fieldstone Property Boundary

Street

Notes:
Composite groups denoted by dashed lines connecting outermost sampling points.

BP - Benzo[a]pyrene
DBA - Dibenzo[a,h]anthracene
OCDD-1,2,3,4,5,6,7,8-octachloro-dibenzo-p-dioxin
PRG - USEPA Region 9 Preliminary Remediation Goals for Soil

N

0 150 300 600 Feet

DIOXIN AND PAH EXCEEDANCES OF RESIDENTIAL PRGS
FIELDSTONE PROPERTY
ORANGE COUNTY, CALIFORNIA

Date: June 2004 | Project No. HR0653

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**FIGURE 4-13**
**PCB-1260 SOIL DATA VERTICAL DISTRIBUTION**
**FIELDSTONE PROPERTY**
**ORANGE COUNTY, CALIFORNIA**